THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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THE METAL INDUSTRY, VOL. III.

With the present issue THE METAL INDUSTRY in its new form, as successor of the *Aluminum World* and *Brass Founder and Finisher*, completes its third year. Our readers will find the index of the articles which have appeared during this year, enclosed within. In looking over the long list of articles, touching upon every phase of the brass and metal workers' art, the publishers feel that they have succeeded in living up to their promise, made in the beginning of the year, namely, that they would endeavor to make the journal more varied and interesting to the workers in the field of the non-ferrous metals than ever before. They have spared no effort to keep in touch with the progress of the art and to procure articles from competent writers, and it is needless to say that this policy will be continued in the future. In this connection it gives them great pleasure to gratefully acknowledge the generous support which they have received from the men in active practice of the metal worker's profession, their contributors and readers. It is a source of pride and gratification to them, that their efforts to conduct THE METAL INDUSTRY honestly, independently and impartially, for the best interests of the metal trade, are meeting with appreciation. For the many words of encouragement and praise, which the publishers have received from the readers and advertisers, they extend their sincere thanks. At the same time they will not forget the obligation it puts upon them to keep on improving the journal and to cover the broad field of the metal workers' art still more thoroughly than they have done in the past. The paper has during the past year been increased by twelve pages, and will shortly be increased again.

THE CHEMIST IN THE BRASS FOUNDRY.

The average brass founder seems to be a very conservative sort of person and somewhat averse to taking up new ideas. This is unquestionably the conclusion one would come to by considering the slowness with which the average brass founder takes up the question of chemical analysis of his metals and products. It is not very difficult, however, to find some reasons for the apparently anomalous condition that the manufacturer of a product which is considerable more complex, as are the alloys of the non-ferrous metals, should be able to get along without the help of an analyst, while the iron founder with his com-

paratively simple product has readily within recent years availed himself of the aid which chemistry furnishes him. One of those reasons is the so-called practical man's deprecating notions about everything that savors of what he calls theory and to which he counts chemical analysis simply because he cannot understand how the chemist works. Happily this class of people is more or less rapidly disappearing, and their place is taken by college men or more enlightened practical men who can appreciate the help which a well directed laboratory can give him.

Another and perhaps the most potent reason for the hesitancy shown by brass founders to avail themselves of the aid furnished by chemical analysis is the very complexity of the product. It is well understood that a chemical analysis of the metals, for instance, which enter into the composition of an alloy cannot and will not positively ensure that the resulting product should be beyond reproach not only as regards chemical analysis, but also physical properties, such as tensile strength, soundness, etc. Too much in the latter respect depends upon conditions with which the analysis as such has nothing to do, such as the care taken in melting the metal, the right temperature of casting, the proper making of the mold, etc. There is a limit to what chemical analysis can show, and the very best mixture of metals may easily be spoiled in the handling. Notwithstanding this limit, however, the advantages of chemical analysis for the brass founder's purpose, especially when he is called upon to make a metal of high strength or very well defined properties, by the addition of small amounts of various metals not ordinarily used, are such as to absolutely justify the expenses incurred on account of it.

PHYSICAL COMFORT OF THE WORKMEN.

There has been a notable change within recent years not only in this country, but also in staid old conservative England, with regard to the proper ventilation of metal working shops. This advance is in line with a more general enlightened policy on the part of the employers who recognize that the metal worker like every other human being is not a machine, but that the surrounding conditions influence him in the same way as they do other workmen. Contributory to this may have been the fact that the increased tendency of the workmen to demand more consideration than they have had in former years compelled a greater recognition of their rights. There is no doubt that when a workman is placed in pleasant surroundings and is not subject to physical discomfort during the hours that he devotes to his work he can do his duty better than if the contrary is the case. Thus, from a mere business point of view, not to speak of the altruistic and humanitarian side of the question, is the adoption of proper and effective means for heating and ventilating metal working and plating shops amply justified.

Chief among the arrangements which contribute largely to the health and comfort of the employees are those for drawing the fine metallic dust and noxious gases away from the workmen. The use of such apparatus has largely increased within the last few years and constructions have been devised which are comparatively inexpensive and efficient to a high degree. Such arrangements should be adopted in every metal working shop and there is no doubt that a substantial gain in the amount of work turned out could be placed to their credit in the ledger, as an offset to their cost of construction.

Plenty of light, which is an absolute essential in a business where the workman is required to pay such strict attention to the proper working and finishing of the objects he produces, should be provided. How greatly this seemingly indispensable condition was disregarded formerly can easily be affirmed by those of our readers who remember the dingy, ill-lighted and worse ventilated metal working shops of former days. Even at this time these have not all disappeared, but they certainly will do so.

It is, of course, not necessary to cuddle the workmen, as some of the modern writers on such subjects seem to advocate. Abstract theories do not work well in practice, however well-meaning the persons may be who throw them out broadcast. The workmen themselves would be quick enough to resent any uncalled for intrusion upon their individual rights. All that is required is to make the surroundings amid which the work has to be performed as pleasant as is possible under the circumstances for the employee and to show him that he is at least considered of as much value as a machine, which latter in nearly every instance is scrupulously cared for. The Golden Rule is a pretty safe one to follow in dealings between employers and employee.

NON-FERROUS METAL PRODUCTION OF THE UNITED STATES FOR 1904.

According to the latest report of the United States Geological Survey the total production and value of the non-ferrous metals produced in the United States during 1904 was as follows:

Metals.	Quantity.	Value.
Silver, coining value.....troy ounces	53,603,000	$69,303,319
Gold, coining value.....troy ounces	4,090,176	84,551,300
Copper, value at New York City.....pounds	812,537,267	105,629,845
Lead, value at New York City.....short tons	307,000	26,402,000
Zinc, value at New York City.....short tons	186,702	18,670,200
Quicksilver, value at San Francisco..... flasks (75 lbs. net)	34,570	1,503,795
Aluminum, value at Pittsburg.....pounds	8,600,000	2,477,000
Antimony, value at San Francisco.....short tons	3,057	505,524
Nickel, value at Philadelphia.....pounds	24,000	11,400
Tin (no metallic produced).....pounds	——	——
Platinum, value (crude) at San Francisco..... troy ounces	200	2,600
Total	——	$309,056,983

In 1904 there was no metallic tin produced, but there were 159 short tons of concentrates shipped to England from South Carolina, South Dakota and Alaska.

Another brass and copper rolling mill is projected, and this time it is to be established at Detroit, Mich. As we go to press we are unable to give the names of the projectors, but understand that there are responsible people and practical men back of the enterprise.

GERMAN SILVER AND ITS USES.

By Thomas Clare.

German silver is sometimes called white copper, and is the alloy which is known in China under the name of packfong. It is an alloy of nickel, copper and zinc, a small percentage of iron being sometimes added. The latter metal, however, is not generally used in this country or in England to the best of my knowledge. German silver is made, as its name implies, in imitation of silver, and it is much harder than this metal. It also has a grayer tinge and a kind of a greasy feeling when it is handled, which is not found in silver or plated ware. The properties which make German silver so valuable are its white color, its lustre, hardness, tenacity, toughness, malleability and ductility. Some manufacturers add a little cobalt to their German silver mixture, but for general use the different grades of alloys of nickel, copper and zinc are the best, especially for rolling and spinning.

GERMAN SILVER TUREEN.
[R. WALLACE & SONS, WALLINGFORD, CONN.]

German silver is a very strong metal, and some grades of it will wear as long as iron. The addition of iron, however, makes the alloy very hard and springy, and much more difficult to handle. The writer made some special metal some years ago for table knives. The firm for which the work was done had bought some knives in New York, and the metal was good white metal, but much too soft. If anything was cut with the knives, such as bread or meat, they would bend. The manufacturers therefore wanted to improve on them and asked me to make some German silver for that purpose. I made the metal and added some iron to the mixture, and after 4 or 5 trials I got it so that it could be bent almost double and would come back straight again. I don't think, however, that any knives of that metal were ever made for the market. The blade and the handle were in one piece, in the same manner as steel knives are made for plating.

In order to manipulate German silver successfully a thorough understanding of the nature of the metal is a prime requisite. For instance, when it is used by the people who have always worked on sterling silver or britannia metal there is every possibility that some of the metal will be spoiled before its nature is understood by the worker. If the articles, for instance, require to be annealed several times in the process of manufacture the workman will soon find out that German silver has to be annealed at the right time or it will crack. It would also crack if it is worked too much. Even if it is annealed properly, a workman who does not understand its nature is liable to dump it into the pickle or quench it in water when it is still hot. Such a procedure will also cause the metal to crack.

The right way of doing it is to lay the work carefully on one side, so that it can cool off after it has been taken out of the annealing oven. I have seen men stare with astonishment when they plunged a piece of work just out of the annealer into the pickle bath and found that the work had cracked. I have seen it done even by good mechanics who did not understand the nature of the metal. The metal can be, however, manipulated easily enough by a good German silversmith, and he can readily make any complicated shape, though sometimes these are very difficult. For instance, it is hard to make a punch bowl, as the latter is made from a circular blank which has to be annealed so many times before it is gotten into shape, that it is a wonder that not more are spoiled in the course of manufacture. Even as it is, if such a bowl is ordered, the workers generally take two blanks in case one should be spoiled in making the utensil.

I remember some years ago that the firm I worked for had an order from a hotelkeeper to fix up his bar with German silver. It was all easy enough to tell the man who had the job in hand to cover the counter with a large sheet of metal. None, however, but a man of great skill and thorough acquaintance with German silver could have hammered the metal flat so that it would lay snug on top of the wood. It was done, however, and looked very beautiful when the job was finished, as German silver takes a very fine polish. A few years after the above order was finished the same firm had another peculiar order, namely to make an ice tank for a yacht. The tank had to be made to fit in a certain place on the yacht, and this was what made it a most difficult job. However, the matter was carried out successfully and gave great satisfaction to the owner of the yacht. These few instances simply go to show how extended and various are the uses of German silver.

The metal is used extensively in the arts, for instance, for making spoons and forks. How many times, however, must a spoon and fork be handled before they are ready for the market! First they are cast in iron molds, then rolled into long strips to the required gauge, then they go to the spoon maker (a trade by itself), who cuts them up to the best advantage. The blanks are then annealed and cross rolled at each end so as to make them wide enough to cut out the bowl of the spoon or the prongs of the fork, as the case may be. When the ends of the blank are wide enough, then the spoons or forks are cut out in the press in the shape of a spoon or fork. The spoon is then bowled and the handle is stamped in steel dies on which are cut the ornament of the different patterns. In most patterns the ornamentation will come up in one blow, but in some patterns the ornament is so deep that they have to receive a second blow, and have to be annealed in between. In order to facilitate the work the manufacturers had an arrangement fixed up by which the annealing could be done with gas right at the drop hammer. Such an arrangement answers very well with sterling silver. When it was tried on German silver, however, it did not work so well, for when the German silver blank was annealed and stamped it was thrown into water in the same manner as is done with solid silver and, of course, it cracked and broke in two when it came out of the water. It would have been all right if the pieces had been laid on one side to cool. This was done by a man who had been in the German silver bus-

iness for years. I simply mention it in order to illustrate my remark that it is not possible to put German silver blanks of any kind into pickle or water while they are hot without considerable danger of spoiling the article.

In a previous article in THE METAL INDUSTRY I mentioned the fact that the operator cannot be too careful when he anneals German silver in the course of manufacturing articles from that metal. More especially is this true of such things as tea pot bodies or anything that is spun upon a lathe or metal blanks that have been drawn with a plunger, such as mugs, whiskey shakers or mixers. When such articles are annealed it must be scrupulously avoided to let the cold air strike them when the muffle is opened in order to take them out. If this is not done they will crack just as though cold water had been thrown over them.

GERMAN SILVER CHAFING DISH.
[R. WALLACE & SONS, WALLINGFORD, CONN.]

Besides being used in the manufacture of spoons and forks, German silver is also largely employed for table and dessert spoons, tea and coffee spoons, gravy and orange spoons, egg spoons, sugar shells and tongs, ice tongs, nut crackers and nut picks. It is also used for pepper and salt tops, napkin rings, cruet holders and stands, soup and toddy ladles, toilet and manicuring sets, snuff and tobacco boxes. It is also used largely for trimmings for dress suit cases, for ladies' purses, chains, lockets, brooches, collar and cuff buttons, cake and butter knives, pie and cake servers, soup tureens, meat and fish dishes, dish covers and waiters of all kinds. A large field for its use is in the manufacture of harness trimmings, carriage and door handles and knobs. It is also employed for sign plates, bells, spurs, watches, watch chains, thimbles, scissors, knife and fork handles, etc. Nine per cent of German silver goods are silver plated. If it is used without plating, care should be taken to keep it clean and dry, as it will tarnish and turn yellow if it is exposed to the air. If vinegar or any other kind of acid is left on it the acid will form a crust, and if it is left on long enough it will eat holes in the metal. If articles made from German silver are, however, kept clean and dry they will give entire satisfaction, as is shown by their extended use.

A stripping solution which is frequently used for stripping silverplated brass and German silver articles is composed of sulphuric acid, with the addition of one-half pound of saltpeter to each gallon of the acid. The solution is to be used hot. It may also be employed for articles of Britannia and white metal.

CLOUDS ON POLISHED METAL CASKET PLATES.

By CHAS. H. PROCTOR.

The writer recently had occasion to examine a casket plate which showed a cloud on it. The plate looked all right when it was plated and finished, but the cloud developed after the plate had been standing from six weeks to three months. Several experiments were made on the plate, and it appeared that the cloud was not beneath or in the electro deposit, but was rather a glaze or blur produced in the final coloring.

The plate submitted was recolored on a soft wheel, using lampblack mixed with kerosene oil as the polishing medium. The plate had the word "Darling" on it, and it was noted that if it was colored half its length, that is to say the letters "Darl" first and then the letters "ing," the cloud would invariably appear. However, by coloring half of the whole word "Darling" at one sweep and then the other half, the cloud would disappear. It is evident that the color wheels which were used are not combed out often enough. Rouge being an oxide of iron will cause the glaze or blur if care is not taken to keep the wheels clean.

After laying several weeks in the laboratory the cloud did not appear again, and has not appeared since. The blurs could also occur by wrapping the goods in a paper which is slightly damp. If attention is not paid to this fact a good deal of trouble is occasioned, especially in the summer time, when the atmosphere is saturated with moisture.

THE VERDE ANTIQUE FINISH ON HARDWARE.

By CHAS. H. PROCTOR.

The procedure in order to obtain the verde antique finish on hardware is different according to whether the finish is wanted for plated hardware or for goods made from solid brass or bronze. If it is desired to obtain the finish on plated goods, the best procedure is to use pigments owing to the corrosion of the plated surface. In connection with this matter the writer published an article in the January, 1905, issue of THE METAL INDUSTRY, describing a method of applying pigment for obtaining the verde antique finish on the soft metal alloys. The method described in that article gives good results and any desired shade of green can be obtained by using it.

For obtaining the verde antique finish on solid metal goods several formulas were given in the October issue of THE METAL INDUSTRY which have proved satisfactory. The following formulas have also given satisfaction. One of them consists of a solution made up of sulphate of copper 1½ lbs., sal ammoniac 1½ lbs. and 1 gallon of water. The other formula contains sulphate of copper 2¾ lbs., sal ammoniac 2 lbs., acetic acid 1 pint, vinegar 1 quart, stale beer 2 quarts, rock salt 2½ lbs. and water 4 gallons. The solution should be used hot. If the articles are slightly oxidized with sulphuret of potash, this will assist in the formation of the green color.

One or two immersions should be given to the articles, and the latter should be dried between each immersion. When the color is satisfactory the articles should be lacquered with a very dilute collodion lacquer. A dip lacquer is preferable in this direction. After drying, the goods should be brushed with a soft plater's hand brush, using a little bee's wax to bring up the soft lustre.

MOLDING MACHINES IN THE BRASS FOUNDRY.

By W. H. Parry.

The history of the molding machine is quite an interesting one and the present aspect of the subject has been fully treated in an interesting article by F. W. Brown in the June issue of The Metal Industry. It would be interesting indeed if the complete history of the molding machine could be written so that the actual originators could be given the credit that is their due. It is an undeniable fact that the stripping plate molding machine at least dates back many years. In fact I have it from competent authority that a pulley molding machine, built on the "stripper" principle, was in successful operation over 40 years ago in England, and undoubtedly some of the readers of The Metal Industry can furnish data to substantiate this claim and may possibly give evidence of still greater antiquity of this modern (?) method of making molds. R. Hoe & Co., of New York, manufacturers of printers' materials, designed a machine some thirty years ago to make sand molds, by first ramming up the flask and then pressing through plates (similar in all respects to a stripping plate) the patterns to the desired depth. From all accounts this was not a succcess and yet how near they were to the real thing, for by a simple reversal of their process they would have stumbled into the stripping plate game with both feet.

My own experience with molding machines dates back about twenty-five years and it may sound singular that we applied the stripping plate principle in the making of cores, never thinking for a moment of its possibilities along green sand lines until quite recently. In the mean time these metal core boxes had worn out and had been replaced by others constructed exactly in the same manner, turning out magnificent work for twenty-five years with never a thought as to what could be done by applying the same principle to green sand molding.

It is, of course, a well understood fact at present, that the brass foundry of to-day in order to be strictly modern and especially such foundries as are engaged in manufacturing, must be equipped with molding machines suited to their respective needs. They may be squeezer, stripper, drop pattern, vibrator, jarring, rock over, roll over, turn over or a combination machine, such as a power rammed, vibrated, drop pattern all in one. I have no doubt that many jobbing foundries could use machines to advantage, as with wooden stripping plates that had previously been cooked in paraffine wax they could rig up very cheaply. In this way they could make a profit on orders of say, 100 or so, provided the pieces were not too complicated in regard to their parting lines.

To my mind the ideal jobbing foundry would be one equipped with three different makes of machine, such as a simple Reynold's squeezer, a Tabor vibrator and a Pridmore long draw machine. With these machines almost any pattern could be worked to advantage and give good results. Of course, it goes without saying that the best results are obtained with machines when used on repetition work, as with properly made patterns, castings can be produced with but little, if any, variation in size and at great speed and with corresponding economy.

In order to illustrate this point I will quote an instance where by hand thirty molds were made in a day of 9 hours at the wage rate of 33⅓ cents per hour. There were two castings to a mold costing 5 cents per casting for labor alone. At present the same pieces are made on a stripping plate machine (home made) which produces 375 castings in 9 hours at a cost per casting for labor of two-thirds of a cent. This shows a decrease in cost of over 86 per cent. and an increase in production of 525 per cent. In addition the castings look much better and are more uniform than when they were made by hand. Another case in point happened in the same brass foundry. A three-part flask job averaging 30 molds of one casting each a day of 9 hours, showed a labor cost of a fraction under 10 cents a casting. By making special iron flasks and using three stripping plate machines, 100 castings are turned out in a day at a labor cost of 4 cents a piece. This shows an increase in production of 233 per cent. and a decrease cost of about 60 per cent. It will readily be seen that the showing here made proves beyond question that the molding machine is here to stay for good.

CASTING OF ALUMINUM AND ALUMINUM ALLOYS.

The use of aluminum casting has rapily increased during the last few years and any data concerning the working of the metal are therefore of particular interest. The following are recent instructions, given by the Pittsburgh Reduction Co., the sole manufacturers of the metal in the United States.

Aluminum castings can be made in any ordinary foundry fitted for making brass castings. The crucible that should be used is a plumbago or black lead crucible, and the metal is melted preferably over a coke fire. If this is not convenient, however, a fire of charcoal, oil or gas can be used, and they are desirable in about the order named. The great object is to use a fuel which is free from nitrogen, phosphorus and silicious gases. It is not advisable to use either hard or soft coal, because these fuels contain more or less of the above gases, which to a certain extent will be absorbed by the metal and occasion blow-holes. If the fuels are used which are here recommended, it will not be found necessary to cover the metal with any substance to prevent its oxidizing.

After the metal is melted it should be removed from the fire and cooled down to the proper temperature for pouring. Its temperature, generally speaking, should be a little above the melting point, or when the metal is a dark cherry red. The exact temperature, however, at which the best results can be obtained is a matter which can only be determined by experience, for the reason that castings with parts of different thicknesses require the metal to be poured at different temperatures. A thin casting, for instance, should have the metal poured at a little higher temperature in order to get additional fluidity than would be necessary in pouring a casting composed of thicker parts.

In cooling the metal down to the proper temperature, this should be done by the addition of new metal, after the crucible of molten metal has been removed from the fire. The metal should not be allowed to grow cold by standing, nor should it be allowed to stand any longer than is absolutely necessary. The cooling is done by stirring it with a bar of metal or an old gate, and it will be easy to see, by the rapidity with which the metal that is added melts, just how much it is desirable to add.

After the metal is once started in order to pour a casting, the pouring should be done rapidly, but at a uniform rate. Castings can be satisfactorily made by the use of an ordinary sand mold such as would be used for brass casting. The only additional precaution which is necessary to be taken is that the mold should be thoroughly well ventilated, and also that it should have a large gate

and a higher riser. These points cannot be too strenuously insisted upon. The object of the large gate and high riser is to allow the metal to flow in and supply the shrinkage as the aluminum in the body of the mold shrinks, and it is very much more necessary to have large risers when sand molds are used than it is when hot iron molds are employed. In the latter case only small gates are necessary.

As in other castings, of course, the finer the sand that is used in making the molds, the more perfect will be the surface of the casting. If it is desired to get an aluminum casting with a fine surface, the best results can be obtained by first facing the mold with a fine Connecticut sand, which has first been thoroughly dried. Then, after the mold has been faced with the sand, it should be baked with the smoke of a gasoline torch. If these precautions are followed, the ordinary brass founder will have no difficulty in making successful aluminum castings.

NEW CORE COMPOUND.

A compound which is to be used for making cores in molding has been invented by Ralph Ditty and assigned to the Buckeye Milling Company, of Cleveland, Ohio. It has been patented with U. S. Patent No. 803,566 of November 7, 1905. It is composed of a mixture of the following materials in substantially the proportions stated. In order to make a ton of the compound there are employed 1,050 pounds of wheat flour, 600 pounds of ground gypsum, 125 pounds of fine sawdust, 200 pounds of common salt and 25 pounds of dextrine, a total of 2,000 pounds. It is stated that marble dust may be substituted for the gypsum, if desired.

The materials are thoroughly mixed in a dry powdered state, and the resulting compound is used as such. The proportions may be varied, and equivalent materials may be substituted for the various materials mentioned above. It is stated that the binding qualities of this mixture are far superior to pure flour and to other compounds. The function of the materials added to the flour is said to be as follows: The sawdust is put in to make the cores open so as to allow the gases generated, while the metal is poured, to escape freely. The dextrine and the salt add binding qualities, the latter also forming a hard crust on the outside of the cores. The gypsum or marble dust is put in simply as a cheap filler.

PROCESS OF MAKING ZINC ALLOYS.

An invention recently patented by P. and A. Guehrs, of Berlin, Germany, with U. S. patent 804,006, November 7, 1905, has for its object a process for manufacturing zinc for zinc coating purposes which will neither form the so-called "hard zinc" nor the oxide, and by means of which resistant durable coatings of zinc may be obtained. The inventors state that this may be done by incorporating aluminum with the zinc. In order to effect the simultaneous melting of aluminum and zinc, the process has to be carried out in such a manner that the aluminum is placed upon the bottom of the receiving vessel and is covered with zinc. About 0.5 to 2 per cent of aluminum are put in. A small addition of some tenth of 1 per cent of tin may also be made to the zinc in order to make it melt somewhat easier.

It is stated that by the use of zinc which contains aluminum and tin, good and durable zinc coatings may be obtained with most advantageous utilization of the zinc bath, inasmuch as these coatings adhere better to the underlying surface. It is claimed that the coating adheres to such an extent that when the sheet is bent the coating will not scale off, and that this will also not take place when the zinc is rolled, hammered or punched. It is furthermore claimed that the vessels used for melting and keeping the molten zinc are less attacked by the molten mass if it contains a small quantity of aluminum and tin.

DESIGN FOR A BRONZE LECTURN.

The peaceful figure shown in cut is an example of a bronze lecturn, which was designed by A. E. Geils and used for church work. In making the lecturn it is first modeled in plasterline in its true size, which is from the floor to the bookrest 6 feet 6 inches. When the model has been sharpened up plaster casts are made of the various parts, each part being carefully marked that there may be no confusion in putting together. The plaster patterns are then ready for the founder. After molding the parts are cleaned and fitted and brazed together. It is now ready for the electro-plater if it is to be oxidized or finished in any particular color. The bookrest which goes with the lecturn is made of brass and is adjustable that it can be raised or lowered.

BRONZE LECTURN.

COPPER ROLLING AND THE USES OF SHEET COPPER.

By Charles H. Proctor.

One of the many important industries of the United States is the production of sheet copper. Both in the amount of capital invested and the value of the finished products, it is entitled to rank with other industries of great magnitude. In common with other large industries it has also made a great deal of progress within recent years. Its development has been such that a person who had visited a copper rolling mill a decade or more ago would be more than surprised in looking over the same mill at the present time and noting the many changes that have been made in its various departments and in the manipulation of the product.

There have been very few additions to the list of manufacturers in this line of business within the past twenty years, in fact, of the few new concerns that have started in that time, some have discontinued business and the result has been what to all intents and purposes might be called a survival of fittest. Most of the business has remained with the old time companies, some of which began their career several generations ago. These companies, with years of experience at their command and with the expenditure of large sums of money, have been able to control the business in this line of manufacture. Many of these large concerns during the past ten years have re-built and re-modeled their mills and have put in the latest devices for saving labor and handling materials. They have spent hundreds of thousands of dollars in order to increase their facilities and to supply the demand for sheet copper. In some of the mills the output within that time has trebled and even quadrupled.

The principal seat of the production of sheet copper in the United States is in the Naugatuck Valley of the State of Connecticut. In this valley, famous for its manufacture of brass goods, there are located within a radius of 20 or 30 miles amid beautiful surroundings a number of large plants, where two-thirds or more of all the sheet copper manufactured in the United States is produced.

The notable mechanical changes that have taken place in some of the modern mills include the general use of raw-hide tooth gears, by which an almost noiseless working is brought about. Another change is the location of the driving power of the mills in conduits below the floor surface whereby they gain a greater increased floor space. Another improvement consists in the general use of friction clutches, by the use of which it is possible to throw out any particular set of rolls or machinery in case of an accident. A further improvement has been accomplished by the increase of speed of rotation of the rolls. This speed has been increased at least one third more than was formerly the case and the reduction in the diameter of the rolls has been almost as much. This means an increase of metal surface production of at least one third over that of a decade ago. It seems to the writer that it would prove a valuable experiment for the rollers of copper if a set of rolls were rigged up and provided with means of increasing the speed of revolution. It should then be possible to find out just how far it is possible to go in this matter and such a procedure might be the means of a surface production on some sizes at least a third more over the present ratio.

Other notable changes have taken place in the annealing muffles, in which a much better concentration of the heat and a much better diffusion of the gases has been obtained. As a consequence the operation of annealing is performed in a much better way, and consequently a better metal is turned out. It is also

*A CONNECTICUT ROLLING MILL. PLANT OF THE ANSONIA BRASS AND COPPER COMPANY, ANSONIA, CONN.

*The sheet copper rolling mills of the United States are, Ansonia Brass and Copper Company, Ansonia, Conn.; Baltimore Copper Smelting and Rolling Company, Baltimore, Md.; Chicago Brass Company, Kenosha, Wis.; Coe Brass Manufacturing Company, Torrington, Conn.; Detroit Copper and Brass Rolling Mills, Detroit, Mich.; Hendricks Bros., Belleville, N. J.; New Haven Copper Company, Seymour, Conn.; Rome Brass and Copper Company, Rome, N. Y.; Taunton New Bedford Copper Company, Taunton and New Bedford, Mass.; C. G. Hussey & Co., Pittsburg, Pa.; Crucible Steel Company of America (Park Mill), Pittsburg, Pa., National Brass and Copper Company, Lisbon, Ohio.

particularly noticeable how very little manual labor is used in loading up a muffle. This operation is mostly performed by power and one man by the aid of a few levers accomplishes the work done by a dozen men according to the old method. This tendency of saving labor is noticeable everywhere. Huge pickling tanks have taken the place of the smaller tanks. Several tons of metal are lowered at one time into them by hydraulic power. The latter also removes them and does the washing and drying by the aid of a few levers which one man moves. For the cleaning of tinned copper a continuous machine is used in order to remove the oxide formed by the heat of the tinning. This machine pickles the sheet, washes it, scours it and dries it out and so quickly is the operation accomplished that it will probably do the work of a dozen men in a day.

Narrow gauge railroads run in every direction and it is thus possible to move larger loads at one time than heretofore and in half the time formerly required. Thus science, mechanics and system have accomplished wonders in the production of sheet copper, and it would only require a slight stretch of imagination to perceive the time when the metal will be rolled, annealed by electricity, cooled in hydrogen without the formation of any oxide, all in one continuous operation and become ready for the market or to be re-rolled without further manipulation.

The uses of sheet copper are many and varied. It is used for outside sheathing on railroad passenger coaches, also extensively by the United States Government, for roofing purposes, distillery operations, in plumbing work, in the manufacture of tea kettles, tea pots, hot water heating apparatus, wash boilers, etc. It is also used for lining bath tubs, in the manufacture of electrical fittings, in the production of celluloid and for various other purposes too numerous to mention. One of the newest features noted by the writer for sheet copper was in Newark, N. J., where the dome of a building was formed of planished copper. The cornice work was of the same material and all of the exterior wood work was sheathed with it. It had apparently been rubbed down with emery and oil, which operation gave it a peculiar rich dull finish and the tone similar to the brush brass finish on brass. It is afterwards coated with spar varnish, which gave a magnificent contrast.

LIGHT COPPER DEPOSITS ON IRON CASTINGS.

By Chas. H. Proctor.

The light copper deposit on iron castings, such as hardware trimmings made from iron, is obtained by electro-plating. If the articles are prepared by boiling in some hot solution it is only possible to get a copper color. A solution for coloring articles in that manner is composed as follows: Water 2½ gallons, blue vitriol 1¾ ounces, and sulphuric acid 1¾ ounces. This solution is used cold. The articles have to be as clean as possible and no grease whatever must be on them. A moment's immersion in the solution is all that is required. A solution to be used with the electric current of 4 to 6 volts and an amperage according to the amount of surface immersed in the solution is composed as follows: Acetate of copper 12½ ounces, bi-sulphite of soda 10 ounces, cyanide of potassium 18 ounces, and aqua ammonia 17 fluid ounces, in five gallons of water. The copper and soda salts are dissolved in 2½ gallons of water and the cyanide of potassium and the ammonia in the remaining 2½ gallons, the solutions being then mixed together. Anodes are used of heavy sheet copper. The articles must be cleaned with hot potash solutions in order to remove the grease and in a 20 per cent. solution of hydrochloric acid to remove the oxide on the surface of the metal. A thorough washing with cold water should be given the articles between each operation.

COLD GALVANIZING PROCESS.

By H. J. Hawkins.

The process of electro plating with zinc, or as it is commonly called, cold galvanizing, is becoming of great importance to the plating industry. It develops not exactly a new field, but a field that has never until recently been worked to any extent, for the very good reason that the cold galvanizing process had never been worked out and controlled in such a manner as to be useful in a commercial sense, until within the last few years. True, it has been experimented with and used in a small way for years.

At present the uses for cold or electro galvanizing are many and still growing. There are several firms selling and installing zinc plating plants. Although the different processes differ very little as to the electrolyte or method of handling the work, yet patents are claimed upon the electro zincing process. But to those who understand the composition of the electrolyte, this does not seem feasible. The principal requirements of a cold galvanizing solution are first, that the deposit must be received upon the hollow spaces and recesses; second, it must be deposited evenly and must have a good color; third, it must be done quickly. It is a difficult matter to get the deposit to penetrate into angles and corners unless the solution is properly balanced, and the amperage is sufficient to do the work. This last is an important question, and the success or failure of the operation may depend entirely upon sufficient amperage to do the work.

Zinc anodes are generally used, but not necessarily; sometimes a non-corrosive anode is employed, and gives very satisfactory results. In this case the solution must be constantly replenished with the zinc salts, as it becomes impoverished very rapidly when large amounts of work are being galvanized.

The cold galvanizing process has several advantages over the hot process. For instance, in hot galvanizing the metal must be just at the proper temperature, for, if the metal is too cold, the plate will be rough and humpy. The process is, moreover, not suitable for small and fine work, such as rivets, screws and hooks, and other articles which must be threaded. as the hot zinc fills up the slots and threads, and thus makes the screw useless.

Then again, all tools, implements, or machine parts which are tempered, cannot be galvanized by the hot process, as the latter would remove the temper. The cold process, having no effect upon tempered steel, is perfectly adapted to galvanizing such articles. Last, but not least, the electro process is much cheaper, while scientific men say that the deposit has wearing qualities equal, if not superior, to the hot process.

One great advantage of the electro process is the fact that the electrolyte and the work are under perfect control at all times. The thickness of the deposit is determined by the length of time the article remains in the electrolyte and the amount of amperage used. Of course it must be understood that the work to be cold galvanized must be thoroughly and properly cleaned, before going into the electrolyte, as otherwise the results will be disappointing.

THE CHEMICAL ANALYSIS OF LATHE TURNINGS.

By Chambers B. Campbell.

The proper amount which the chemist ought to have for making analysis of lathe turnings is about a cigar box full. The whole sample is spread thinly upon a newspaper and with the aid of a spatula about 5 grams at a time are taken from all parts until an amount equal to 100 grams is obtained. The latter amount is then weighed and brushed into a Battersea "G" crucible and about 10 grams of commercial potassium cyanide are sprinkled in. A blacksmith forge is used, or equivalent source of heat, in order to melt the charge down. When the crucible is white hot the turnings ought to be in a liquid state and the operation usually takes about ten minutes time.

The crucible is then taken from the fire and the mixture stirred with a pine stick until the metal starts to mold. It is then allowed to cool until the hand can be placed upon it. Immersing it in cold water while hot will harden the button of metal, thus making it difficult to drill. The button is knocked out instead of breaking the crucible, so that the latter can be used several times. The button is cleaned of cyanide by the use of hot water and grain alcohol. It is then weighed and the weight found is the percentage of yield.

In order to drill the button a vise is used to hold it, which vise is provided with a piece of hollow metal in order to hold the button up in the clutch. The button is then center-punched in the oval side in order to start the drill nicely. About 5 grams are drilled first and discarded. Then the drill is run straight through and the drillings are caught underneath on a piece of clean writing paper.

In nearly all such turnings iron and steel turnings are present, which contaminate the others. Such iron and steel turnings are melted up with the others, but it is also possible to pick them out with a pair of forceps or a magnet. If the tin is to be determined when the iron amounts to, say, over one per cent., the metastannic acid formed by the addition of nitric acid is partly dissolved or entirely so.

In order to overcome this difficulty the operation is conducted as follows: One-half gram of the button drillings are weighed out and brushed into a 250 cubic centimeter beaker. They are brought into solution with 10 cubic centimeters of nitric acid of 1.42 specific gravity. The nitric acid is evaporated off till nitrous fumes appear. Five cubic centimeters of sulphuric acid of 1.84 specific gravity is then added at once and the solution evaporated down till copious sulphuric anhydride fumes appear. When much zinc is present, bumping is liable to occur and the solution has then to be heated carefully. After it is run down to the desired degree it is removed, allowed to cool and made up to 30 cubic centimeters with cold water. It is then allowed to stand until it is clear or partly so and filtered into a 400 cubic centimeter beaker. The precipitate obtained in this operation is lead sulphate and is washed with 2 per cent. sulphuric acid water and weighed. This gives the percentage of lead present in the turnings.

The filtrate is made up to 200 cubic centimeters with cold water and hydrogen sulphide gas is run in briskly for twenty minutes. The solution is then filtered into a 600 cubic centimeter beaker and the precipitate washed with hydrogen sulphide water. The filtrate is placed on a bare hot plate and boiled hard. A hole is punched into the filter, holding the precipitate and the latter is washed with hot water into a 200 cubic centimeter beaker. The filter is washed then with hot 1 to 1 nitric acid and the solution boiled hard in order to get the copper into solution. About 10 cubic centimeters of hydrochloric acid are then added in order to get the tin into solution. The solution is evaporated to a small bulk and an excess of nitric acid added, after which the solution is again evaporated just short of dryness. It is then diluted with hot water and allowed to stand in a warm place until it is clear and is then filtered. The precipitate is weighed as stannic oxide, thus giving the percentage of tin present.

The copper is precipitated in the filtrate with sodium hyposulphite or it is obtained by difference. When the filtrate that has been boiling is perfectly clear and smells no longer of gas, ammonia water is added in order to precipitate ferric hydroxide. The solution is then boiled and allowed to stand for some time and filtered. The iron is then either determined as iron oxide and weighed as such, or by redissolving the precipitate in 1 to 1 hot hydrochloric acid and titrating with potassium bichromate solution.

To the filtrate there are added 25 cubic centimeters of a solution containing 100 grams mercuric chloride and 100 grams ammonium chloride in 2,000 cubic centimeters of water. Hydrogen sulphide gas is then passed into this solution for twenty minutes and the precipitate allowed to settle. It is then filtered off and burned to zinc oxide, which will give the percentage of zinc in the alloy. Manganese and nickel are not supposed to be present. Lathe turnings include washings, pin dust, buffings, emery dust and all that class of material.

ANTI-FRICTION BEARING METAL.

A new alloy, which is stated to combine the desirable features of the so-called high-grade babbitt metals and bronzes in the respect of their strength and durability with the advantages of comparatively low fusion and increased anti-friction qualities, is stated to be prepared as follows: A quantity of lead is melted and metallic magnesium added to it in amounts varying from ½ of 1 per cent to 5 per cent of the whole. The magnesium is put directly into the melted lead, both metals being excluded from the oxygen of the air by means of a fluorspar flux. With proportions of 5 per cent of magnesium in the lead the alloy produced is stated to be crumbly, brittle and generally unserviceable for practical purposes.

An alloy of 2 per cent of magnesium is stated to be quite hard and excellently adapted for uses requiring great elasticity or strength, but for journal bearings in general, whether for heavy loads or high speeds, from 1 to 1½ per cent of magnesium has been found to be most satisfactory. Preferably 1.25 per cent of magnesium is used and 98.75 of lead. The metal melts approximately at 663 degrees F., and may be poured safely into cast iron journal seats. It is stated that the alloy resembles lead in appearance and retains the slippery qualities of the latter metal. It has, however, a higher melting point, and sufficient elasticity to give it a metallic ring. The alloy has been patented with U. S. Patent No. 803,920, November 7, 1905, by F. W. Moffett of Bloomfield, N. J.

Tin which has been melted several times always contains a proportion of oxide produced by the surface oxidation of the metal. The quality has, of course, been deteriorated by the presence of the oxide.

ETCHING OF METALS ON A LARGE SCALE.*

By William Voss.

In this article I shall endeavor to explain how etching is performed on a large scale on such articles as clock dials, name plates, scales, dials, etc., for musical and electrical instruments, thermometers, compasses, machine plates, advertisements, etc. The field is quite a large one, as is evidenced from the foregoing list. Before going further, however, I wish to state that these methods cannot be used on a small scale to any advantage, for, in order to operate them successfully, the work should be turned out in large quantities.

If, for instance, it is required to make several hundred watch dials the procedure to be followed is as follows: In the first place a design of the dial is made. It is usually made many times larger than the article itself is going to be. The next step in the process is a very delicate one, and as it takes considerable time and experience to master the art I shall not enter into details, as that work is best done by competent and experienced men. This step is the making of an aluminum plate which acts as type. It consists in having a photo-engraver make several paper prints, say 22 of them, of the dial. These prints must be reduced almost to the size the dial is intended to be.

They are then trimmed and pasted upon a sheet of white cardboard, care being taken to leave a space between each dial, which is to allow for stamping and for leaving the proper margin. The photo-engraver then makes another negative of this set of dials as they appear upon the cardboard. The dials should be of the right size. The markings at the outer edge are there for the purpose to allow for cutting the dials up when they are finished, so that they may be cut straight.

The photo-engraver now makes an aluminum plate which is to be used as type, so that when the printing is done from this plate either directly or indirectly the dials will print correctly on the brass sheet where they are required to be. The photo-engraver will etch the aluminum plate to the proper depth. A lithographic stone may also be used instead of the aluminum plate, and printing may then be done directly from the stone. If the aluminum plate, however, is used, the impression is transferred to a soft roller, and then to the desired plate or sheet in a lithographic press.

After the stone or the metal are prepared, the sheet brass is cut up to the desired size, which should be from ½ to ¾ inch wider than the type. The brass is then polished either in a polishing machine or by hand in order to remove dirt or grease. By polishing machine is not meant the buff machine, but a machine with 2 iron rollers, in which fine emery is used. After the sheet has been polished it is ready for printing, and care should then be taken not to touch the face with the fingers. The sheet, before printing is done, may be plated or it may be left as it is, depending upon the finish which the article is desired to have.

The sheet of brass is then printed, tusch being used for this purpose, and it is then powdered before it dries. The powder which is used for this purpose consists of various proportions of asphaltum, rosin and dragon's blood, which are boiled together and then cooled. When this mixture is hard and dry it is powdered very fine. The operation of powdering must be done very thoroughly by brushing the powder over the sheet with a very soft brush. When the ink has taken all the powder it can take the plate should be well dusted and all the powder removed from where it is not wanted. This operation is of the utmost importance, for if the plate carries any of the resisting material where it is not wanted, this place will not etch and the resisting material must be removed before it will. After the plate is powdered and dusted it is burned, that is, it is held over a gas stove until the resisting material melts. This should be done with the fact of the plate up, and too much heat should be avoided inasmuch as it will spoil the plate. The plate is then allowed to cool, any pin holes are retouched and the back of the plate is painted with liquid asphaltum. When the plate is dry it is ready for etching.

The etching tanks are usually about 6 to 8 feet square and about 12 to 15 inches deep. They are made so that they can be turned, in order to give the solution a chance to flow over the plates from different directions. They are also constructed so that they can rock a few inches. If the etching bath flows only in one direction it would leave streaks, and therefore the tank should be turned around every little while. The plate should also be brushed over every now and then with a soft brush. The etching bath consists of chloride of iron to which enough hydrochloric acid has been added to keep the articles etching evenly. Enough chlorate of potash should also be added to keep the bath slightly warm, taking care that not too much is added, as this causes the bath to become too warm and to strip off the resisting material.

The process of etching requires considerable experience. If too much iron solution is present it will turn the brass black. After the plates are etched they are given a bright dip without removing the resistant material, and are then brought into the chemical bath. This consists of copper carbonate, ammonia and water, and the plates are left in there until they are black. The resistant material is then removed with benzine or turpentine. The plates are well cleaned, lacquered and cut up. When the etching bath is not in use it should be kept in a stone jar containing scrap iron, and, when wanted, some of this bath with the acid and potash is used. Care should be taken in handling and keeping the chemicals which make up the bath.

*Etching Metals on a Small Scale. Published in the November issue, 1905, of The Metal Industry.

CORROSION OF NICKEL COPPER ALLOYS IN SEA WATER.

In view of the enormous quantities of alloys of different composition which are used on board of ships, investigations of their behavior when exposed to the action of sea water are particularly interesting. The following results in the case of nickel-copper alloys have been found by Diegel in Germany.

The composition of a series of copper-nickel alloys of German manufacture and their mechanical properties are tabulated below:

It is evident that the alloys are very close to open hearth steel as far as their tensile strength is concerned. As shown by No. 1 to 4 the strength of the alloys is not very much different when they contain 20 and 40% of nickel. An addition of about 5% of

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aluminum increases the tensile strength to double the amount, but this large addition of aluminum makes it more difficult to obtain sound castings. The temperatures, between which the alloys can be forged, are also confined between narrower limits. The alloys No. 1 and 4 are the best for practical purposes.

These two alloys were therefore chosen for a series of tests in sea water, in which tests bars made of them were suspended on plates made of the same alloy, of electrolytic copper, of pure tin bronze and of iron, in order to ascertain the damage done to the nickel-copper alloys if they are exposed to the action of sea water either by themselves or in contact with other metals or alloys. To note on the other hand what influence the nickel-copper alloys had on the destruction of other copper alloys, bars made of pure tin bronze, of iron bronze and of aluminum bronze were suspended on plates made of the nickel-copper alloys. The tin bronze had the following composition: 89 copper and 11 tin, without phosphorus. The iron bronze contained 57 copper, 42 zinc and 0.5 to 1 iron. The aluminum bronze showed about 88.25 copper, 7 aluminum, 1.5 silicon, 2.75 iron and 0.5 zinc.

The results obtained by a long continued test were as follows:

1. Both nickel-copper alloys do not behave very much differently in sea water. They can be said to have stood up very well.

2. When the alloys were exposed to sea water either alone or in contact with metallic copper, the alloy with 42% of nickel was attacked somewhat more evenly than that with 20%. When the alloys were in contact with the tin bronze, the opposite was the case.

3. Both alloys suffer less when they are in contact with other metals than when they are exposed by themselves. The nickel-copper alloys are consequently protected by the other metals when in contact with the latter. The protective action exercised by copper and tin bronze is not considerable, whereas iron completely prevents the corrosion. Those copper-nickel bars which had been suspended on iron looked exactly the same as before the experiment, when they were taken out and cleaned, after having been in the sea water for 32 months.

4. Other copper alloys are comparatively strongly attacked when they are exposed to salt water in contact with nickel-copper alloys. This damaging influence is somewhat greater in the alloy with 42% nickel than in that with 20%.

The iron bronze (57 copper, 42 zinc, 1 iron) was completely corroded after 32 months, but the outer

Composition and Properties of Various German Copper-Nickel-Alloys.

No.	Specific Gravity.	Composition by Analysis. Cu.	Ni.	Fe.	Pb.	Zn.	Mn.	Sn.	Al.	Si.	Condition of Material from which Test Bar was taken.	Tensile Strength. Lbs. per sq. inch. Beginning of elongation.	Permanent elongation of 0.2 per cent.	Ultimate.	Elongation, per cent.	Reduction of Cross-Section, per cent.	Behavior on Forging.	Behaviour under Cutting Tools.	Color.
1	8.85	56.8	42.32	0.36	....	....	0.43	....	0.07	0.07	Forged.	7018	34128	68256	34	55	Forges very well, like wrought steel; temp. limits for forging about 900 to 1020° F.	Works softer than iron, cuts well without sliming. Grinds well.	Greyish white. Looks like steel
2	8.39	78.93	18.93	0.88	0.02	0.16	0.02	0.11	0.93	....	Forged.	36972	46926	68256	20	57	Forges very well, somewhat like iron. Temp. limits appr'x. like 1; little unsound	Very tough in working. Grinds well.	White, somewhat yellowish
3	8.78	79.7	19.95	0.07	....	....	0.06	....	1.22	..	Forged thick round bars.	36872	44082	69078	21	61			
											Test bar specially forged.	41238	49770	68256	17.5	60	Good. Scales form easily on the surface during forging.	Satisfactory.	White, with somewhat yellowish cast.
											Same end cold hammered from 20 to 19.5 millimeters diameter.	61857	72522	91008	11.5	56			
											Same from 20 to 19 millimeter diameters.	75360	88104	92430	7	60			
4	8.84	77.3	20.33	2.35	....	....	....	....	....	....	Forged thick round bars.	35550	44082	69678	29	66			
											Test bar specially forged	41238	49770	71130	24	64	Good. Scale formation on surface little noticeable.	Works and grinds well.	White, very little yellowish.
											Same from 20 to 19.5 millimeters.	52614	61146	73944	15	62			
											Same from 20 to 19 millimeters.	61146	71100	78210	13	62			
5	8.25	75.81	18.26	0.09	0.03	0.11	0.01	0.16	5.50	....	Forged.	122292	.....	142200	2	11.7	Forges in dark red condition, like cast steel. Becomes brittle at low temp. showed unsoundn'ss	Very tough during treatment. Grinds well.	Yellowish white
6	8.196	81.08	14.5	0.19	0.08	....	0.02	....	4.85	0.07	Forged.	100650	119148	130824	6	10	Forges well at about 1440 to 1620° F.	Works and grinds well.	Yellowish white

shape and the dimensions of the bar showed hardly a change. The tensile strength and the elongation, however, had gone down to zero, as the zinc had been completely leached out. In outward appearance this fact could only be recognized by the more reddish color of the alloy.

The aluminum bronze had suffered somewhat more than the tin bronze, though the loss of weight was less, but the loss in tensile strength and elongation was considerably greater. It has to be taken into consideration, however, that the aluminum bronze contained 7% of that metal and about 4% of iron and tin. Pure 10% aluminum bronze had been demonstrated to be more stable by former experiments.

The density of standard gold is 17.48, while that of the alloy which contains 900 gold and 100 copper is 17.16.

RAPID CHUCKING MACHINE.

By W. L. Abate.

These machines are intended for the rapid boring, facing and tapping of the pipe ends of valves and cock bodies, the boring and tapping of union nuts, milling of valve stems, boring and seating bibbs, threading shanks of bibbs, or other articles made of brass or iron. The tools are run in the spindle of the lathe. The work is held in a chuck which is very rigid and is a part of the saddle of the lathe. The chuck is made so as to receive the regular jaws of an ordinary two-jaw chuck. The chuck is operated by a lever handle on the top. The machines are illustrated in the adjoining Figs. 1 and 2. The illustrations show their improved form, the previous construction having been described in the January, 1905, issue of The Metal Industry.

FIG. 1. FRONT VIEW.

In order to place a piece of work to be operated upon into the chuck it is only necessary to raise the lever, drop the work in the jaw and bring the lever down to a catch which holds it firmly in place. Elbows, ties and all irregular pieces, as well as round stock, may be gripped in the chuck. The machines are supplied with all necessary countershafts, wrenches, etc. Nearly 50 per cent of the general brass work now being handled in the turret lathe may be finished at about one-half the cost. The ordinary cutters, taps and dies generally used in turret lathes will fit this machine without change. The machine will thread nipples 18 in. long.

A friction device is placed on the spindles, instead of the ordinary step cones. These friction devices are operated by a handle at each end of the machine, or they may be connected so as to work in conjunction with the saddle. These connections allow a piece of work, the operator places a piece in the jaws, revolves and automatically stop the die or tap or reverse the machine as the operator desires it. As only the spindles of the machine are reversed, a great saving of power by this feature alone is obtained. By this arrangement the whole machine is easily controlled by the pilot wheels. When the machine is set for certain work, the operator places a piece in the jaws, revolves the pilot to engage the die, which, upon going the desired distance, reverses the spindle, thus removing the die from the work. The pilot is carried back to its original position and, in so doing, it again reverses the machine, throwing the clutch in the forward motion ready for the next piece.

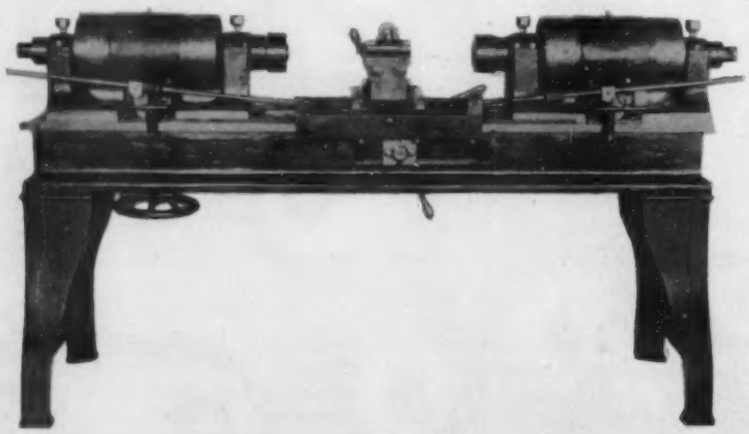


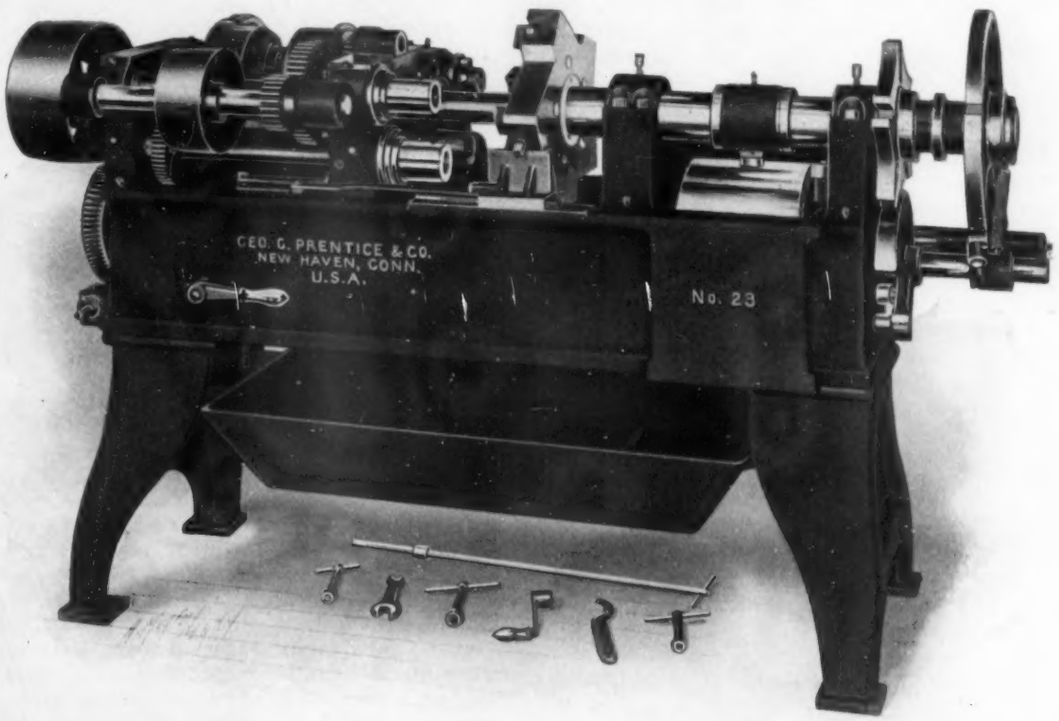
FIG. 2. REAR VIEW.

In a recent run 400 ½-inch pipe ends were finished in an hour and forty minutes, and 1,660 ½-inch water bibbs, shanks and nose ends were completed in ten hours. The machines are built and placed on the market by W. L. Abate, mechanical superintendent of the Nathan Manufacturing Company, New York.

The Edna Smelting & Refining Company, of Cincinnati, Ohio, have recently put in considerable new brass working machinery and tools. They make railroad bearings, oil cups, babbitt metals, ingot metals, trolley wheels, and a portable metal melting furnace which has been described in a former issue of The Metal Industry.

MULTIPLE SPINDLE AUTOMATIC TURRET LATHES.

The multiple spindle automatic turret lathes differ widely from any other type of machines, as they are entirely automatic in operation and rapidly and accurately perform all boring, turning, drilling, reaming, threading and other operations on castings, forgings and similar pieces. The accompanying figure shows a four-spindle, single-end machine. The spindles each carry a tool for the different operations the work is intended to undergo. These spindles revolve, and the work is automatically indexed and fed up to the revolving tools by means of a cam strip on the feed drum. The length of the longest cut required on any piece determines the angle of the feed cam and the proper feed for cutting the metal is obtained by gearing the cam shaft to one of the spindles. For different work the feed can be quickly changed by substituting different gears.



PRENTICE MULTIPLE SPINDLE LATHE.

Before starting the machine an unfinished piece of work is placed in the upper section of the chuck. The machine is then started and the chuck indexes around automatically, bringing the piece of work in line with the tool in the first spindle at the front of the machine. The chuck advances automatically until the first operation is performed. A second piece of work is then introduced and finished. Meanwhile the first piece has been brought by the revolution of the chuck to a position where it faces the second spindle and is operated upon by the second tool. The third piece is then introduced, and the other pieces advance correspondingly, until four different pieces are being operated upon at the same time, each receiving a different cut. When the chuck indexes again after this, bringing a fifth piece to the first spindle, the first piece is again at the top of the chuck, after having passed through all operation and being finished. It is then removed by the operator and an unfinished piece is introduced in its place, the cycle of operations going on as before.

The great saving in time effected by these machines is due to the fact that the machine is not stopped to chuck the work, and that all operations on any piece are finished complete within the time that would be required by any other machine to finish the longest single operation only. It is claimed that various kinds of pieces are finished from two to five times faster than is possible by any other method, while the cost of labor is usually not as great as for an ordinary hand screw machine. All the operator does is to place the rough work in the lathe and remove the finished pieces. On large brass work and on most steel and iron work, one operator can often supply two or more machines.

Two styles of each size of single end machines are built, namely, first operation machines with sectional box chucks, and second operation machines with sectional face plates. The first operation machines finish one end of a piece complete, and they cover a large majority of turret machine work. There is, however, considerable work that requires finishing on both ends, when it is not practical to finish both ends at the same time in one of the double-end machines, and where the operations in the first machine are liable to injure the piece, if it is held in the false jaws of the box chuck. The operations on the reverse end must then be done in the second operation face plate machine. Box chucks and face plates are not interchangeable in the same machine. The tools are built by George G. Prentice and Company, New Haven, Conn.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

Q.—I should like to have a receipt for an acid copper solution for rose finish to be plated on small brass work such as brass buckles, pocketbook corners, etc. It is wanted for a cheap class of brass work in general.

A.—Acid copper solutions to be used in connection with cheap rose gold finishes should consist of 24 oz. of commercial sulphate of copper and 4 oz. of commercial sulphuric acid to each gallon of water. It is advisable to add one or two oz. of white gelatine or the best transparent white glue, dissolved in warm water, for each 50 gallons of solution. The addition of these substances causes the deposit to be more uniform. The articles should be relieved on the high lights with pumice stone or sea sand, after coppering and before immersing in the gold solution. The anodes to be used in connection with this bath should be of soft copper.

Q.—How may I cast in a plaster of paris mold and get a white metal, the following alloy: Bismuth 25 per cent, nickel 21 per cent, copper 54 per cent. Each time I cast my design the oxide forms and the metal is black when the mold is opened, instead of being white as it should be. I melt the metals in a crucible, allowing air to get to the metals as they are melted.

A.—It would be advisable to use a flux consisting of 75 lbs. of fluor spar and 25 parts by weight of slacked lime. The ingredients should be mixed thoroughly together and allowed to dry. If the compound dries out in lumps it should be pulverized. When melting the metal it should not be exposed to the air any more than can possibly be avoided, and a little of the above flux should be used. This will prevent the formation of the oxides.

Q.—I should like to inquire how the seamless floats used in boiler water columns are made. I have been advised that some of these floats are made by depositing copper upon a rubber bag. These floats are sometimes called upon to stand a steam pressure of 150 to 200 pounds per square inch.

A.—The method of coating rubber bags with copper to be used as floats in boiler columns is not used to our knowledge. Most of them are made in two halves soldered together, and the seam closed down by pressure. One of the latest methods of manufacturing them consists in drawing the shells rather more than half the size which they are intended to be and leaving sufficient stock to close them down to the desired shape. This is done by hydraulic pressure, and oil is used to maintain the shape of the balls.

Q.—Kindly give me a receipt for a 50-gallon nickel plating solution to be used for brass faucets and stove trimmings.

A.—A composition for a 50-gallon nickel solution for the purpose mentioned is as follows: Water 50 gallons, single sulphate of nickel 18 pounds, sal ammoniac 12 pounds, and boracic acid 4½ pounds. The solution should be prepared as follows: Dissolve the sulphate of nickel in 5 gallons of hot water, the sal ammoniac in 3 gallons and the boracic acid in 2 gallons of water. Place the balance of 40 gallons of cold water in the tank and add the nickel solution and stir thoroughly. Add the sal ammoniac next and then the boracic acid. The solution should be stirred thoroughly, and then it is ready for work. Cast nickel anodes should be used with this solution.

Q.—Kindly give me the mixture of the so-called ship metal for box-like castings used by the U. S. Government, and a good mixture for phosphor-bronze for gear work.

A.—The composition of the formulas used on U. S. Government interior fittings, such as those referred to, consists of 75 lbs. copper, 20 lbs. zinc, 5 lbs. lead, for small boxes, and 80 lbs. copper, 15 lbs. zinc and 5 lbs. lead for medium-sized boxes. For large-sized boxes with a small diameter in thickness, 80 lbs. copper, 15 lbs. zinc, 2 lbs. tin and 3 lbs. lead are used. These mixtures should be run as hot as possible, and the molds should be thoroughly dried. A good phosphor-bronze mixture for general work consists of 88 lbs. copper, 5 lbs. Straits tin, 5 lbs. phosphor tin and 2 lbs. of lead. For phosphor-bronze bearing the following mixture might be used: 86 lbs. copper, 4 lbs. Straits tin, 5 lbs. phosphor tin, 3 lbs. zinc, 1 lb. antimony and 1 lb. lead. The above figures are based on 100-pound mixtures.

Q.—I should like to have the formula for a good bronze solution for pocketbook frames.

A.—Bronze solutions as a rule consist of a copper solution with a small amount of zinc and 26 per cent of ammonia added to the copper solution. The brass solution to be used for the above purpose should have the following proportions: Water 1 gallon, C. P. cyanide of potash 8 oz., carbonate of copper 4 oz., carbonate of zinc ½ to 1 oz., carbonate of soda, 2 oz., and a sufficient amount of ammonia to bring up the color. In order to change a copper solution to a brass solution, a saturated solution should be made up consisting of 2 parts of potassium cyanide and 1 part of carbonate of zinc with 1 pint of ammonia added to each gallon of the solution made up. This solution should be added to the copper solution until the desired color is obtained.

Q.—Kindly favor us with a good red metal mixture made up of the following scrap metals, namely: Scrap copper, wire scrap, red brass, new lead, new zinc and new tin. We should like to have a close metal which has at the same time good cutting qualities. We should also like to have a good red metal mix, made up of new metals entirely.

A.—The following formula should prove satisfactory: Scrap copper wire, 70 lbs., scrap red brass 26 lbs., new zinc 2 lbs., tin 1 lb. and lead 1 lb. If ½ of 1 per cent of aluminum is added just before pouring, better castings with a closer grain will be obtained. A good red metal mixture of new metals should consist of lake or casting copper 89 lbs., zinc 5 lbs., Straits tin 4 lbs. and lead 2 lbs. If strict attention is paid to the temperature of the metal, this mixture will give solid castings with good cutting quality.

Q.—We have a nickel solution which is plating very bad. It streaks black from screw holes in the work that is to be plated, and tarnishes and pales in the solution. The solution stands at 7 degrees Baumé and is slightly acid. Kindly suggest a remedy.

A.—The trouble with your nickel solution may arise from three causes. In the first place it may be too acid, in the second place it may be too weak in metal, and in the third place it may have a poor conductivity. If you are positive that the solution is not too acid, reduce it with water until it stands at 5 Baumé. Save

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

the solution in order to add it back again to the bath as occasion requires. Then add 1 to 2 oz. of single sulphate of nickel and 2 oz. of sal ammoniac to each gallon of solution in use. This will freshen the bath up and increase its conductivity which seems to be lacking.

Q.—Please give me some information as to how to make a royal copper finish on silverware by depositing it on.

A.—In order to produce a royal copper finish on silver articles it will be necessary to deposit a good heavy coating of copper upon the articles. This is preferably done in an acid sulphate copper solution. The articles are afterwards polished to a high finish. In order to produce the royal copper effect the lead bath and the Bunsen flame mentioned in the June issue of THE METAL INDUSTRY can be used. The saltpeter method might also be used, which consists in melting saltpeter with a little water in an iron crucible and immersing the articles until a blackish oxide is formed. They are then removed and immersed in kerosene oil. They are afterwards colored on a soft buff wheel, using wood alcohol and powdered rouge to bring out the royal copper finish. An acid copper solution may be made up by adding to each gallon of water 1½ pounds commercial sulphate of copper and 4 oz. commercial sulphuric acid.

Q.—I should like to have a formula for an alloy suitable for armature bearings in street cars.

A.—For armature bearings in street cars, to stand the wear and tear they are subject to, it will be necessary to use a phosphor bronze mixture. This gives the best results for such purposes. You might try the following mixture for bearings subject to strain and hard usage: Copper 86 lbs., phosphor tin 5 lbs., Straits tin 4 lbs., zinc 3 lbs., antimony 1 lb. and lead 1 lb. Bearing mixtures of the common alloys consist of the following proportions: For light bearings: Copper 84.5, tin 13.3, zinc 2.2, or copper 83.6, tin 12.6, zinc 3.8. For heavy bearings: Copper 84, tin 12 and zinc 4, or copper 77, tin 9 and zinc 14. When using scrap old metal the following mixtures might be used: Copper 38, zinc 1, tin 7, old metal 54, or copper 50, zinc 2½, tin 8½, old metal 45.

The Monarch Engineering & Manufacturing Company, of Baltimore, Md., are greatly pleased with the headway their crucible furnace is making and report that they are placing as high as six additional furnaces in foundries which have originally placed a trial order. The foundrymen like the furnace because it melts the metal in crucibles using oil as fuel. The demand for the furnace is so brisk that the company is unable to accumulate stock. They recently equipped the Horn & Brannen Manufacturing Company, of Philadelphia, Pa., with a complete outfit of furnaces for melting metals and oil burners for drying cores, brazing chandelier work and heating nests of crucibles. The equipment was satisfactory. The Monarch company have recently put out a new leaflet.

The Pittsburgh Reduction Company are building a two-story laboratory, 60 x 50, at their New Kensington, Pa., plant. They have just moved into their new office, which is a nicely furnished building 100 x 40. All plants of the company are running to their utmost capacity and the management is planning further improvements.

READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing, rolling and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

POWER PRESSES.

To the Editor of THE METAL INDUSTRY:

In reading the interesting article upon power presses by Mr. Porter, on page 215 of your November issue, we notice the statement that toggle-drawing-presses, so called, are the "universal" machines for making all kinds of drawn metal articles, and that they are preferable to cam-presses in all cases. Certain phenomena, leading to this proposition, may have occurred in the development of the particular presses treated of in the article in question, but we wish, emphatically, to deny that it is a proposition applying to presses in general. On the contrary, it is well known that thousands of cam-presses are, and have been, working successfully in Europe, as well as this country, for all kinds of work, from light cartridge making up to the drawing of the largest and heaviest kitchen utensils. Toggle-presses may be, and are, made to work successfully, especially when, as is often the case, the motions of the toggle are controlled by a cam in regard to the "dwelling" action necessary in such a case, as, otherwise, it is impossible to get a perfect "dwell." The chief objection to them is their multiplicity of parts, with enormous working joints, and consequently great wear and more frequent adjustment. The toggle system was doubtless developed to remedy certain deficiencies in some previously made cam-presses where the widths and diameters of the cams were inadequate in size for the work they had to do, and where lifting springs were too weak and were not durable on account of imperfect design, in the way of not putting enough metal in them, etc.

We, as manufacturers of the Ferracute presses, long ago decided to properly develop the cam-press, preferring it on account of its greater simplicity and smoothness of action. In this we have had entire success, simply by careful attendance to proper design in the way of not only making the cams and rollers of proper material, but of much greater width and diameter than had been used previously. In addition to this the shafts of the presses were made abnormally large as regards strength, for the sake of getting unusual stiffness. The rollers were mounted upon shafts of their own, and arranged to run in oil cups, with their journals running in bronze boxes, etc. By these changes in design, together with providing short spans between the shaft journals, and adequate lifting arrangements, cam-presses for metal drawing of all kinds have been made the equal of any toggle-presses, with the advantages before referred to—that is, smoothness of action and simplicity of construction.

FERRACUTE MACHINE COMPANY.

The Cabbaging Press, manufactured by the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., is a press which is useful for large users of scrap. The press has been installed in a number of the large brass foundries. It saves the time and the labor of the old method of pounding up scrap with a mortar, ball and bar.

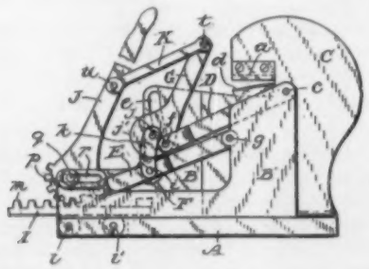
PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

803,588. November 7, 1905. Pump for Molten Metal. H. C. Hansen, Newton, Mass. The invention relates particularly to the construction of the piston of pumps for molten metal so as to make the piston easily fit into the cylinder and easily adjustable when it is worn. This result is secured by constructing the piston end in the shape of a frustrum of a cone. The active surface of the piston, however, is formed by a metal sleeve which fits over the tapered end of the piston. The outside of this sleeve is cylindrical and the inside is tapered. With this construction it is possible to easily bring the piston to the necessary diameter again if it should have worn during use.

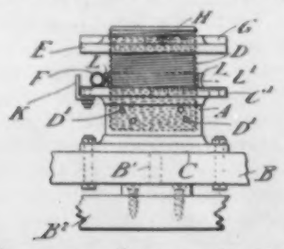
803,763. November 7, 1905. Bearing for the Rolls of Rolling Mills. J. T. Horner, Newcastle, Pa. The invention has for its object to preserve the proper temperature of the rolls used in rolling mills and to secure their proper and economical lubrication. For this purpose the rolls are mounted in bearings which have suitable recesses and are formed with water circulating channels which permit the contact of the circulating water with the brasses. A portion of the circulated water traverses the entire area of the inner faces of the brasses and also the neck, the fillets and the ends of the rolls.

804,579. November 14, 1905. Shears for Cutting Metals. J. C. Burgess, Sullivan, Ind. The construction is particularly intended for use in small shops, and is portable. Its essential



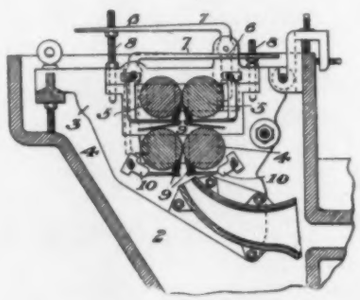
parts comprise a base A with upright framed members B and B'. To the upper portion of the member B is attached a shear head C, to which is secured a shear blade A. In using the apparatus the lever J is to be moved to an upright position when the lever G will also be in an upright position. By this means the shear blades will be opened so that the metal to be cut may be placed between them. The lever J is then moved downward, which operation will also move the lever G downward. Thus, the arm E will rise and carry with it the fulcrum end of the lever G. This will at the same time raise the end of the cutter arm D and cause the shears to operate.

804,732. November 14, 1905. Apparatus for Bending Metal Tubes, Rods and the like. W. Kennedy, West Drayton, England. The apparatus serves the purpose of bending a metal tube, rod or the like to any desired angle without producing undue expansion. It consists essentially of a fixed pipe, which has a



heavy flange and an externally screw threaded hollow mandrel. The latter is secured in the fixed pipe and provided with a clamping nut, so that the pipe F can be securely clamped. A plug is inserted in the end of the hollow mandrel and is adapted to receive the pin of the bending lever. The curvature of the bend may be varied by means of blocks consisting of ring segments or collars L of varying thickness, by which the effective diameter of the mandrel D may be changed.

802,607. October 24, 1905. Coating Machine. L. C. Steele, Wheeling, W. Va. The advantage of the invention is claimed to be due to the appliances for removing the surplus metal from the squeezing rolls, thereby preventing them from carrying it up and redepositing it on the plate. As shown in the accompanying illustration, the apparatus consists of a tinning pot 2, which contains the ordinary tinning machine suspended on end hangers 3. In these housings are mounted the lower part of the rolls 4, and the two upper rolls 5. Under the lower rolls 4 as well as be-



tween them and the upper rolls 5, there are arranged longitudinal metal brushes 9, with their upper edges cut to a curve so as to make them fit closely to the surface of the rolls. In the operation of the machine the pot is filled with molten metal to within a few inches of the lower rolls. On this molten bath is poured the oil, which covers the lower rolls and partially submerges the upper rolls. When the sheet passes upward between the rolls as it emerges from the bath, the rolls squeeze the surplus metal from it.

803,802. November 7, 1905. Brazing Compound. J. W. Ball, Woodbine, W. Va. The compound consists of the following ingredients by weight: 6 oz. of muriatic acid C. P., 1½ oz. pure zinc, 1 oz. of pulverized borax and 2 oz. of boiled water. It is particularly adapted for use in brazing band saws. In making the compound the borax is dissolved in water free from iron or sulphur and the zinc is dissolved in muriatic acid. The two solutions are then united and the whole is filtered, after which the brazing compound is ready for use. A suitable coloring material is added before the solution is bottled, so as to give it a distinctive color to prevent mistakes.

803,800. November 7, 1905. Polishing Belt Deflector. E. W. M. Bailey, Amesbury, Mass. The device is intended for use with a traveling polishing belt for the purpose of applying it to the inner side of the belt. It is intended that the operator should manipulate the belt in a similar manner as far as the direct pressure on the surface and the extent of the surface operated upon it is concerned to that which he would employ with the ordinary hand pad. He is thus enabled to know how much force is being applied to the surface operated upon and can readily vary it as required. The belt deflecting device preferably consists of a thin sheet or plate of a smooth surfaced, flexible material, such as celluloid. The flexibility of the deflecting device enables the operator to vary the area of the belt-engaging surface, both longitudinally and transversely.

802,712. October 24, 1905. Machine for Coiling Wire. G. H. Scott and G. E. Bigelow, Worcester, Mass. Assignors to Morgan Spring Company, Worcester, Mass. The machine is intended for manufacturing coiled wire springs and comprises one or more pairs of rotating feed rolls by which the wire is continuously fed forward. A rotating arbor is provided, the peripheral movement of which exactly corresponds with the feeding movement of the wire. Means for the adjustment of the axis of the rotating arbor in relation to the line of movement of the wire as it is fed to it are provided, and also for the adjustment of the wire coiling mechanism with relation to the feed rolls. Means are also provided for raising or lowering the bending roll relatively to the plane of the rotating arbor and for varying the axis of the bending roll relative to the axis of the arbor in correspondence with the desired pitch of the spring.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

D. R. Wyant, of Rockford, Ill., reports that he has just opened a job shop for plating.

The Roberts Chemical Company's new plant at Niagara Falls is nearly completed and will be in operation this month.

The Wago core binder, used largely in making cores, is marketed by the Buckeye Ore Milling Company, Cleveland, Ohio.

A brass foundry established some time ago by Thomas F. Fallon, of Lawrence, Mass., is making a specialty of aluminum castings.

L. Greenbaum, a metal dealer of Cincinnati, Ohio, has just installed three new melting kettles, one of which will hold 10,000 pounds of white metal.

H. J. Hawkins, the consulting plater, is now making a specialty of equipping and starting cold galvanizing plants. He is an expert in all kinds of plating.

Mr. T. Cadman, of 795 Kohler street, Los Angeles, Cal., who is starting a plating plant in that city, is in the market for machinery and chemicals used in plating shops.

The Ornamental Art Metal Works, of 216 West Houston street, New York City, are prepared for making iron backgrounds in Bower-Barff finish at a reasonable rate.

Benjamin Middleditch, of Detroit, Mich., manufacturer of foundry machinery, is very busy on orders for 800 gasoline engines. He also has constant orders for his foundry machinery.

The National Metal Molding Company will erect a large steel frame building at Economy, Pa. The contract has been awarded to William B. Scaife & Sons Company, of Pittsburg, Pa.

The Norton Emery Wheel Company are building a new office for their Niagara Falls plant. Many of the industrial works in Niagara have built handsome offices in the last few years.

Owing to their increased business the Niagara Machine and Tool Works, of Buffalo, N. Y., may build a new boiler house and blacksmith shop. They manufatcure sheet metal machine tools.

The Fort Wayne Smelting and Refining Works are getting their new brass foundry and storehouse at Detroit in shape. They have a four-story building and the foundry is placed on the upper floor.

The Genesee Metal Works, Rochester, N. Y., report that they are in better shape than ever to handle the growing demand for their metals, but still are not large enough, and are planning to enlarge their plant.

George A. Ray Manufacturing Company, Buffalo, N. Y., report that they were never so busy as at the present time. They are running overtime in an attempt to keep up with the demand for their house furnishing goods.

The Capitol Foundry Company, of Hartford, Conn., has been organized to take over the iron foundry business of the Standard Foundry Company, at Parkville, Hartford, Conn. The Standard company will continue its brass foundry.

The entire manufacturing properties of the Household Sewing Machine Company, of Providence, R. I., consisting of machine shop, iron foundry, brass foundry and cabinet works, were sold at auction on the 27th and 28th of November.

The Phenix Tube Company, of Brooklyn, N. Y., will shortly occupy a 100 x 100 foot two-story brick addition to their factory and a new office building. The company are installing six new machines for drawing and straightening tubing.

The Borough Bronze Company, 132 West Twenty-fourth street, New York City, wholesale dealers in gas fixtures, have gone into the hands of a receiver. Mr. Sutherland D. Smith has been appointed by the Court to act in this latter capacity.

S. Johancen & Company, of Baltimore, Md., have bought property at the corner of President and Styles streets in that city and will put up a three-story brick building, 50 x 100, thoroughly equipped for the manufacture of white metals.

The Phosphorized Metal Company, of Philadelphia, Pa., have started to move to their new plant, a 40 x 60 structure located at Cambridge, N. J., where they will make phosphorized and ingot metals and other products used by brass founders.

The Reliance Metal Company, scrap iron and metal brokers, New York City, has been incorporated with a capital of $25,000. The incorporators are: Michael A. Rourke, 43 Exchange Place; Montague Newton, Hugh Francis Doris, all of New York.

H. J. Reese, C. Fischer and F. G. Kaltenbach have been in business for about two months under the name of the Genesee Nickel Plating Works, at 14 Post street, Rochester, N. Y. They are doing all kinds of nickel, copper and brass plating, brass finishing and oxidizing.

The Chase Rolling Mill Company, of Waterbury, Conn., announce that the continued advance in metals necessitates their withdrawal of all prices or quotations and that all orders for goods hereafter received will be filled at prices in accordance with the metal market.

The Standard Brass Foundry Company, Cleveland, Ohio, have just opened an aluminum foundry adjoining their brass plant, which has some of the modern accessories to foundry shops, viz., shower baths and lockers. The aluminum foundry is large enough to keep thirty molders busy.

The Aluminum Manufacturing Company, of Du Bois, Pa., have succeded the Never-Tarnish Manufacturing Company of that city. The company will manufacture aluminum hairpins, aluminum fur chains and novelties. They will also do nickel, silver, gold, bronze, copper and brass plating.

The Philadelphia Roll & Machine Company, of Philadelphia, Pa., are making a 20-inch rolling mill for the Riverside Metal Company, of Riverside, Burlington County, N. J. The Philadelphia company have recently equipped a number of the rollers of non-ferrous metals with rolls and rolling mill machinery.

The W. W. Sly Manufacturing Company, Cleveland, Ohio, are erecting a temporary wooden addition 60 x 90 feet to their new concrete and steel plant. The concrete building is 240 x 80 feet, two stories, and 125 tons of steel were used in its construction. The W. W. Sly people make a specialty of foundry equipment.

The Schaeffer & Budenberg Manufacturing Company has begun to move its departments from Brooklyn, N. Y., to Foxboro, Mass., and is about to start operations at that place. The superintendent, Mr. Otto Buttel, has already taken charge. The company has awarded a contract for the constructon of a large brass foundry.

The Damascus Bronze Company, of Philadelphia, Pa., report that they were never so busy as at the present time, turning out their metallic products. They manufacture railroad bearings, all grades of babbitt metals, phosphorized copper, phosphor bronze, Damascus bronze ingot and other metals which are used by foundrymen.

TRADE NEWS

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Clum & Atkinson, Rochester, N. Y., who have one of the largest brass foundries in the country, have recently been casting a number of shaft sleeves which took 2,000 pounds of metal each. The order came from one of the steamship companies of New York City, and the firm feel gratfied to think that these New York orders come their way.

The factory of the Wire Goods Company, of Worcester, Mass., recently suffered a loss from fire which started in the tinning room. The furnaces in the tinning room set fire to the flooring and started what would have undoubtedly proved a disastrous blaze if the automatic sprinklers had not acted promptly and prevented a considerable loss.

As we go to press there are published accounts of a merger or non-merger of the two great American lead producers, viz.: The United Lead Company and the National Lead Company. Some reports say that the merger has been declared off while others state that a final conference will be held in December which will result in a merger.

The Hercules Brass Foundry, Eighth, below Chestnut street, Reading, Pa., which was established last April, reports that they have been very successful up to this time. Specialties such as crosses, placques, chandelier work and others are made and jobbing is done. The plant is roomy and complete and the owner anticipates a very bright trade for next year.

Messrs. Sidney Shepard & Co., of Buffalo and New York, and C. Sidney Shepard & Co., of Chicago, Ill., announce that they have incorporated under the name of The Republic Metalware Company, of Buffalo, N. Y., with a capital of $1,500,000. The directors are: C. Sidney Shepard, Chas. W. Wells, James F. Foster, Sidney Detmers and Franklin Agge.

The Baltimore Copper Smelting and Rolling Company have taken new offices temporarily at the corner of Sharpe and Bates streets, Baltimore, Md. In the spring they will move into the new Keyser building, which is a ten story office structure erected on the site of the one that was destroyed by the Baltimore fire at the corner of German and Calvert streets.

The Excelsior Brass Works, of Reading, Pa., were damaged by fire to the extent of $3,000 on September 16. Since the fire, however, they have been running thirteen hours every day with additional hands, owing to the many orders on hand. They report that they have also booked some large contracts for brass work to be delivered during the first three months of 1906.

Among the proposals issued by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for metals, supplies and machinery furnished by the non-ferrous metal industry and kindred interests, are the following: Tobin bronze, hoop brass, copper rod, zinc anodes, etc. Dates for bids are December 12-26. Further particulars may be had from the Bureau.

The New Haven Silver Company, of New Haven, Conn., will start in the manufacture of Craig metal, which is stated to be the nearest approach to sterling silver yet produced. The company is a Connecticut corporation with an authorized capital stock of $200,000. Its officers are: President, Benjamin Slade; vice-president, Samuel Goodman; secretary, Charles Freedman; treasurer, Max Strauss.

The extensive wire weaving plant of the Gilbert & Bennett Manufacturing Company, of Georgetown, Conn., was damaged by fire on November 16th. The fire was confined to merely one wing of one building. The insurance is already adjusted and contracts are out for a new building. The company reports that the loss does not affect it in regard to decreasing production or prompt shipment of all orders.

The Goulds Manufacturing Company, of Seneca Falls, N. Y., will greatly enlarge its No. 2 shops. The plans call for a foundry 144 x 500 feet, a pattern shop 162 x 42 feet, five stories high, an engine house 55 x 70 feet and a boiler house 72 x 50 feet. There will also be two pattern storage buildings 82 x 42 feet each, a rattle room 42 x 160 feet, and a new office building. The brass foundry is in the main foundry.

J. G. House, secretary and treasurer of The Kettler Brass Manufacturing Company, of Houston, Texas, reports that the company is doing a nice business and has lately increased its facilities and foundry and machine shop. They do work for saw, rice and cottonseed oil mills, etc. They also say that they have been for a long time subscribers to THE METAL INDUSTRY and welcome its appearance every month. They enjoy reading it and are benefited.

The United Zinc & Chemical Company, of Chicago, Ill., state that they manufacture the best and strongest lye on the market, the ordinary lye having only half the strength of their product. Therefore consumers do not have to use as much of it. It is especially suitable for the use of metal workers and platers in the cleansing of metals. Manufacturers who have tried it are very well satisfied with the United Zinc & Chemical Company's product.

J. J. Ryan & Co., of Chicago, who have one of the largest jobbing brass foundries in the United States, if not the largest, report that they find it impossible to read all of the trade journals which are delivered at their office, but they make a point to look at THE METAL INDUSTRY each month and then hand the paper to the heads of their foundry, finishing and plating departments. They say there is never an issue of THE METAL INDUSTRY but what they find some article of interest.

F. L. & J. C. Codman, buff manufacturers with headquarters in Boston, Mass., have moved their Chicago factory to Detroit, Mich., where they have obtained a building at Champlain and Beaubien streets. They are putting in machinery from their Eastern and former Western works and will soon have the Detroit shop in shape to manufacture solid buffing wheels, including bull neck, canvas, sheepskin, walrus and paper. Mr. J. C. Codman will be in charge of the Detroit plant.

O. J. Mousette, of Brooklyn, N. Y., reports that he has been selling a number of "Monarch" crushers and pulverizers during the month of October. Among others, he sold to the following: Colonial Smelting and Refining Company, Philadelphia, Pa., 5; Philadelphia Metal Refining Company, Philadelphia, Pa., and Brooklyn Copper Refinery, Brooklyn, N. Y., 2 each; United States Reduction Company, Chicago, Ill.; J. S. Leslie, Paterson, N. J.; Handy & Harman, Bridgeport, Conn., and Elliott's Metal Company, Birmingham, England, 1 each.

The capital stock of the Benedict & Burnham Manufacturing Company, manufacturers and rollers of brass and copper, of Waterbury, Conn., has been increased from $400,000 to $650,000. The object of the increase was to enable the company to take over the property and effects of the Holmes, Booth & Haydens Company, which went into effect on the first of November. The business heretofore carried on by the Benedict & Burnham Manufacturing Company and the Holmes, Booth & Haydens Company will hereafter be conducted by the Benedict & Burnham Manufacturing Company.

Some of the brass foundries which were recently equipped by the J. W. Paxson Company, of Philadelphia, Pa., are: Public Hardware Works, of Philadelphia, who are polishers and finishers, but have recently put in a brass foundry; the Lloyd Garrett Company, the same city, chandelier manufacturers, and the brass foundry of the Frankfort Arsenal, Bridesburg, Pa., who have been altering the building and making improvements in their

TRADE NEWS

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brass foundry. The J. W. Paxson Company also recently equipped the brass foundry of the Cuba Central Railroad, located at the Sauga La Granda, Cuba.

NEW CATALOGUES

Patterson, Gottfried & Hunter, Ltd., sellers of machinery, metals, hardware, tools and supplies at 146 Centre street, New York City, have issued a leaflet on their Ellis Off-Set Wrench.

The latest leaflet of the Rockwell Engineering Company, 26 Cortlandt street, N. Y., shows their flue welding furnace which will take flues up to 4 inches in diameter. Oil or gas fuel is used.

Seldner & Enequist, manufacturing chemists, Brooklyn, N. Y., have issued new circular matter concerning their non-acid, non-corrosive soldering fluid, which is especially adapted for the brass and copper trade. Free samples of the fluid can be obtained by addressing the makers.

The International Silver Company, of Meriden, Conn., have issued book No. 70, which is an illustrated price list of their complete line of "1847 Rogers Bros." plated table silver. Accompanying this 60-page catalogue is a vest pocket price list and several interesting reproductions of *The Silver Standard*, a monthly newspaper, established in 1847 by the Rogers Bros.

The Colwell Lead Company, 63 Centre street, N. Y., are distributing Catalogue D., covering their line of lead pipe and tubing, sheet lead, lead cames, solder, lead traps and bends, etc. The last 20 of the 59 pages contains much valuable information and data, characteristic of, and applying to, the lines embraced in the catalogue. This collecttion of data and formulae should prove very valuable to the trade.

Sectional Catalogue No. 67 relating to hydraulic accumulators and a few valves, especially used with them, has just been issued by the Watson-Stillman Company, builders of hydraulic machinery, with works at Aldene, Union county, N. J., and offices at 46 Dey street, New York. So far as this firm knows, no similar catalogue has ever been issued, and it therefore contains particularly interesting information for all users of this class of machinery. The hydro-pneumatic accumulator which the firm have been building for several years is entirely re-described in the new catalogue.

An interesting catalogue has just been issued by the Bates & Peard Annealing Furnace Company, of Huyton, Liverpool, England. The catalogue first takes up the subject of annealing the non-ferrous metals, presenting cuts and a thorough description of their method of annealing metals in steam, which was described in the July, 1904, issue of THE METAL INDUSTRY, and then shows their various types of furnaces for other purposes, including jewelers' furnace, coin furnace, fillet furnace, fine wire furnace, single tube wire furnace, cartridge type furnace, and other details about their larger furnaces. The catalogue is one which will prove of considerable interest to all manufacturers of non-ferrous metal products.

PERSONALS

Henry L. Schwarzenberg, a sales agent of the Waterbury Crucible Company, located at Cleveland, Ohio, has issued a circular on The Waterbury Crucibles, giving sizes and particulars.

Ralph Dow, secretary and general manager of the Dow Chemical Manufacturing Company, manufacturers of platers' supplies, Mansfield, Ohio, was in New York on business the week of November 19th. The Dow Company announce that they make no pretensions to a monopoly of the best material (Canadian nickel) for making nickel anodes, but that they do claim to make anodes that are first class in every respect, made of Canadian nickel, and guarantee to give satisfaction.

W. F. Wambold, Appleton, Wis., who recently started a foundry at 270 Fourth street, Milwaukee, writes that he considers Milwaukee one of the best foundry centers in the country, and while he has a plant at Appleton, employing thirty-five men, he also thought it best to establish another one at Milwaukee. Mr. Wambold also says that he appreciates THE METAL INDUSTRY very much.

The following are some recent changes in New England foundries: A. S. Buzzell, assistant foreman of the Reid's Foundry Company, Worcester, Mass., has become foreman of the Washburn shops of the Worcester Polytechnic Institute, Worcester, Mass.; Corridan & Haggerty, formerly with Higgins & Co. Brass Company, Holyoke, Mass., have started a foundry in the same city, calling it the Paper City Brass Foundry. Some of the foundry equipment was supplied by William J. Nicholson, Providence agent of the Cutter, Wood & Stevens Company.

A "stop thief" bulletin has been issued by Commissioner William M. Webster, of the Chicago Brass Manufacturers' Association. The bulletin includes a photograph of the wished-for thief who is mentioned as one David Mitchell, alias D. E. Mitchell, who is also described as an ex-convict and bigamist and was arrested in Chicago on August 31, 1905 for stealing from the Turner Brass Works. He has jumped his bail and is now a fugitive from justice. He follows the trades of tinner, brazier, brass worker and assembler. He is declared to be a dangerous man and any one employing him is requested to telegraph or telephone at once to John M. Collins, Chief of Police of Chicago, who has Mitchell's picture and measurement under the Bertillon System.

George G. Blackwell, chairman of Geo. G. Blackwell Sons & Co., of Liverpool, England, has returned to England after a visit to the leading steel centers of the United States. Mr. Blackwell announces that his firm are pioneers in alloys and metals, and first introduced high grade electrolytic ferro-silicon of 25, 50 and 75 per cent. as more economical than the lower grades round about 11 per cent, while by its use practically no impurities were introduced into steel. Several makers one after another turned their calcium carbide plants into making this grade, hence competition became so strong a syndicate was formed. Now Geo. G. Blackwell Sons & Co., Ltd., are interested in and represent the largest, newest and most up-to-date ferro-silicon works, which he says is entirely outside the syndicate, and hence deserving of support. Geo. G. Blackwell Sons & Co. also state that they are the largest mine owners in the world of fluor spar, which is used extensively in melting brass.

METAL MARKET REVIEW

COPPER.—The London copper market has been very firm and active consequent on a scarcity of metals, and prices have been pushed to higher levels than for several years. Standard copper opened at £71 10s., advanced steadily to £78 12s. 6d. on the 28th, and closed at £77 7s. 6d.

The New York copper market during the month has passed all reasonable bounds, and for the time being has gone beyond the control of producers. The market has undoubtedly been very cleverly worked up and helped along, but beyond all this it is now a well established fact that consumption has been enormous, and for the time being production has not been able to keep pace with this enormous consumption. What is going to happen two or three months hence is another story. Consumers are placing contracts now for the first quarter of next year; the price, apparently, is not of so much importance as the necessity of obtaining a supply of metal for their actual requirements. The total exports for the month will total about 14,000 tons, against 22,294 tons same month last year. The price of Lake and Electro for delivery this year is 18 cents, against spot copper a month ago at 16¾ cents, and the price was then considered "too high." The leading selling interest early in November sold to consumers

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

several million pounds at 16½ cents per pound; to-day the market is 18 cents, and consumers are clamoring for copper. Production is steadily increasing, and with the high prices sooner or later affecting consumption we should be having a more normal market during the next few months. The spot market is entirely nominal. Lake and Electrolytic, 18 to 18¼c.; casting, 17¾ to 18c.; February, March and April delivery ⅛ to ¼c. lower

TIN.—London bull operators have had the tin market completely under control, and prices have been steadily pushed up, as America had to come in to buy. We consume three tons of tin to England's one, and yet out of a total shipment of tin from the sources of supply England buys 3,000 tons or more while America buys 500 or 600 tons, and for the balance of her needs America has to go to the London market. The spot price of tin in London opened at £149 10s., and advanced steadily and almost daily to £157 at the close, and bets have been made that tin will go to £175 before next June. Of course bets don't make the market, and June is quite a ways off, but it shows what kind of crazy bulls there are in the market.

In the New York market we have had a strong, active and advancing market all the month. Consumption, according to the Metal Exchange returns, was 3,600 tons. Prices for round lots opened at 32⅞ and closed at 34.40 paid.

LEAD.—The London lead market has ruled very strong, and prices have reached a higher level than for several years. Opening at £14 18s. 9d. lead advanced to £16 3s. 9d. at the close.

In the New York market lead has been very scarce. The trust price was advanced from 5.15 to 5.25, and while the nominal shipment price is 5.25 for New York delivery, shot lead has been very scarce, owing to delayed shipments and careful manipulation by the trust, and consumers have paid as high as 5¾ and 6 cents for their immediate needs; the market closes strong; spot, 5¾ to 6 cents; shipment lead, 5¼ 50 ton lots.

At the moment of going to press the lead trust has advanced the price of lead $2 per ton, making New York shipment price 5.35c. per pound.

SPELTER.—London market has been dull and quiet. Prices advanced from £28 5s. to £28 15s., and closed at £28 12s. 6d.

The Western spelter market has been very interesting to watch; the price was hammered down to 6 cents, and there was a quiet hunt for spelter. The ore situation was a strong one and pointed to higher prices for the metal. Prices fluctuated between 5.95 and 6.05 until about a week back, when a leading New York interest came into the market and started to buy up all cheap lots. Prices were run up from 6 cents to 6¼ paid for delivery East St. Louis, and the market closes strong at the advance.

The New York market has followed the Western advance, and sellers here generally look for higher prices. It is pointed out that spelter is the only metal that has not advanced in proportion to the other metals, and it is proposed to help it along. Shipment spelter at the end of the month, 6.35 to 6.40 asked, carload lots.

SILVER.—Scarcity of supplies combined with a considerable short speculative interest in the market, have helped to send the price of silver both here and in Europe to higher levels than for several years. At the same time Russia and China have been heavy buyers in Europe of the white metal for coinage purposes, while India has only been taking her usual supply. Traders in the metal in this market look for lower prices rather than any further advance.

OLD METALS.—The market for old metals has been fairly active in sympathy with the advance in all the base metals. No. 1 composition has been in good demand, also all kinds of brass and copper scrap. The export demand has been good, but owing to the high prices ruling there have not been many orders placed. Zinc dross holds firm, and the late advance and higher outlook for spelter has helped to strengthen all holdings of dross and skimmings.

SHEET METALS.—Owing to the advance in ingot copper the price of sheets and tubes have been advanced 2 cents per pound, making the base price for sheet copper 23 cents.

In the January issue of THE METAL INDUSTRY we shall publish an interesting review of the metal market of 1905.

TRADE WANTS

ANSWERS SENT IN OUR CARE WILL BE FORWARDED.

COPPER BRASS ROLLING TUBE AND WIRE MILLS (Hot or Cold). A thoroughly practical man requires a situation as superintendent or head foreman for the above, with life experience. Age 38; good references. Address ABILITY, care THE METAL INDUSTRY.

ACCOUNTING AND AUDITING.

Books written up, balances taken off. Profit and loss statements and balance sheets and reports made. Small accounts solicited; high-class work done. Charges reasonable. JOHN C. ALMOUR, 257 Broadway, New York City.

WANTED—SUPERINTENDENT for a new aluminum factory; must be experienced; to be in full charge; given interest if found satisfactory. Address SUPERINTENDENT, care THE METAL INDUSTRY.

WANTED—Salesman to sell crucibles; give age, experience and salary expected. Address BRASS CRUCIBLE, care THE METAL INDUSTRY.

WANTED—An active, educated man to take charge of a brass foundry. Must be thoroughly conversant with foundry practice, accustomed to molding machines and handling of oil furnaces. We want a thoroughly competent brass man, and to such can guarantee a pleasant position and a permanent job. Address, giving full particulars as to age, experience, salary, etc., W. P. C., care THE METAL INDUSTRY.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 284 Pearl street, New York City.

AGENCY WANTED—Want good selling article; metal goods preferred; other lines considered; have large store with bulk windows on main street in Philadelphia; would introduce new goods; established 40 years in metal line. Address NELLA, care THE METAL INDUSTRY.

POSITION WANTED with reliable firm by a plater who is an expert on solutions and hustler on all colors. Understands silver deposit on glass and china. Address PLATER FOREMAN, care THE METAL INDUSTRY.

ROLLING MILL EQUIPMENT FOR SALE—One stand, 16x32, and one stand 17x24 chilled rolls, with two sets driving gear, all complete. One 4 ft. by 8 ft. annealing furnace. One No. 4 Cincinnati geared squaring shear, 36 in. knife. One No. 205 Niagara circle slitting shear. One heavy Farrell foundry, slitting shear, slits 3-16 stock, in use only one year and practically new. Also 12x30 Corliss engine and boiler complete; used to drive above, and several other items, pickle and water tubs, etc., for use in rolling sheet silver, brass or kindred metals. Address ROLLING EQUIPMENT, care THE METAL INDUSTRY.

FOR SALE.—Three Hill barrels for recovering metal from brass ashes. First-class condition. Address HILL BARREL, care THE METAL INDUSTRY.

WANTED—One 42-inch SCHWARTZ FURNACE in good condition. Address SCHWARTZ, care THE METAL INDUSTRY.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

Metal Prices, December 6, 1905

METALS

	Price per lb.
Tin—Duty Free.	
Straits of Malacca	35.25
Copper, Pig, Bar and Ingot and Old Copper— Duty Free. Manufactured 2½c. per lb.	
Lake	18.25
Electrolytic	18.25
Casting	18.00
Spelter—Duty 1½c. per lb.	
Western	6.45
Lead—Duty Pigs, Bars and Old 2½c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	6.10
Aluminum—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
Antimony—Duty ¾c. per lb.	
Cooksons	13.50
Hallets	13.00
Other	12.50
Nickel—Duty 6c. per lb.	
Large lots	45 to 50
Small lots	50 to 75
Bismuth—Duty Free	$1.50 to $2.00
Phosphorus—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
Silver—Duty Free	$0.63
Platinum—Duty Free	21.50
Gold—Duty Free	20.67
Quicksilver—Duty 7c. per lb. Price per Flask.	41.00

Zinc—Duty, Sheet, 2c. per lb. 600-lb. casks, 7.75 per lb., open, 8.75 per lb.

Tobin Bronze—Rods, Unfinished, 20c.

Tobin Bronze—Rods, Finished, 21c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	21c.
5 per cent	22c.
7½ per cent	23c.
10 per cent	24c.

Manganese Bronze, Ingots	19 to 20c.
Phosphor Bronze, Ingots	19 to 23c.
Silicon-Copper, Ingots	32 to 36c.

OLD METALS

Heavy Cut Copper	17.00	17.50
Copper Wire	16.50	17.00
Light Copper	14.75	15.00
Heavy Mach. Comp.	14.75	15.00
Heavy Brass	11.25	11.75
Light Brass	9.25	9.75
No. 1 Yellow Brass Turnings	10.25	10.50
No. 1 Comp. Turnings	12.75	13.25
Heavy Lead	5.30	5.40
Zinc Scrap	5.00	5.25
Scrap Aluminum, sheet, pure	22.00	25.00
Scrap Aluminum, cast, alloyed	12.00	18.00
Old Nickel	15.00	25.00
No. 1 Pewter	22.00	24.00

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	23	23	23	23	23	24
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	24
	Longer than 96 ins.	23	23	23	24	23	25
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	23	23	23	23	23	25
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	23	23	25
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	23	24	26
	Longer than 120 ins.	23	23	23	24	25	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	23	23	23	24	25	27
	Longer than 72 ins. Not longer than 96 ins.	22	23	23	24	26	28
	Longer than 96 ins. Not longer than 120 ins.	23	23	23	25	27	31
	Longer than 120 ins.	23	23	24	26	29	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	23	23	23	24	26	29
	Longer than 72 ins. Not longer than 96 ins.	23	23	23	25	27	32
	Longer than 96 ins. Not longer than 120 ins.	23	23	24	26	29	
	Longer than 120 ins.	24	24	25	27	31	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	23	23	24	26	31	
	Longer than 96 ins. Not longer than 120 ins.	23	23	25	28	33	
	Longer than 120 ins.	24	24	26	31		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	24	24	26	29		
	Longer than 96 ins. Not longer than 120 ins.	25	25	27	30		
	Longer than 120 ins.	26	26	28	32		
Wider than 108 ins.	Not longer than 132 ins.	27	27	29			
	Longer than 132 ins.	28	28	31			

Rolled Round Copper, ⅝ inch diameter or over, 23 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, December 6, 1905

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb. ..... 27c.
Lighter than 10 oz. ..... 33c.
10 oz. and up to 12 oz. ..... 30c.
12 oz. and up to 14 oz. to square foot, per lb. ..... 28c.
Circles less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 22½ per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.28	$0.27	$0.28
Above No. 10 to No. 16.....	.28½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 20 and 2 per cent.; Copper Wire, 20 and 2 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 22c. per lb.
Seamless Copper Tubing, 25c. per lb.
For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.....	30	29	24	23	23	22	22	22	22	22	22	23	24	26	28	29

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

									Per lb
Plain	Round	Tube,	⅜	in.	up	to	2	in.,	to No. 19, inc.	$0 35
"	"	"	⅜	"	"		⅝	"	" 19, "	36
"	"	"	½	"	"		⅝	"	" 19, "	38
"	"	"	⅝	"	"		⅝	"	" 19, "	41
"	"	"	⅝	"	"		¾	"	" 19, "	48
"	"	"	¾	"	"		¾	"	" 19, "	65
"	"	"	¾	"	"		⅞	"	" 19, "	1 00
"	"	"	⅞	"	"		⅞	"	" 19, "	1 50
Smaller than ⅛ inch.....										Special
2 inch to 3 inch, to No. 19, inclusive.....										38
3 inch.....										4
Over 3 inch to 3½ inch.....										4
Over 3½ inch.....										50

Bronze and copper advance 3 cents. Discount 30 and 2 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	3 in. 12 in.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in	Cutting to Length.	Polishing or Satin Finishing One side.
	in coils.										
No. 13	42	42	44	44	44	44	47	47	47	1	2
" 14	42	42	44	44	44	44	47	47	47	1	2
" 15	42	42	44	44	44	44	47	47	47	1	2
" 16	42	42	44	44	44	44	47	47	47	1	2
17	42	42	44	44	44	44	47	47	47	1	3
" 18	42	42	44	44	44	44	47	47	50	1	3
" 19	42	42	44	44	44	44	47	48	51	1	4
" 20	42	44	44	44	44	46	49	50	52	1	4
" 21	42	46	46	46	46	48	51	52	58	2	5
" 22	42	46	46	46	48	48	51	55	59	2	5
" 23	42	46	46	46	48	48	51	57	60	2	6
" 24	42	46	48	50	50	50	53	59	62	2	6
" 25	44	47	49	51	51	51	54	61	65	2	7
" 26	44	47	50	54	54	54	59	63	69	2	8
" 27	44	48	52	56	56	57	62	66	72	2	10
" 28	44	48	54	56	57	57	64	70	75	2	11
" 29	46	49	56	58	60	60	69	75	80	2	13
" 30	46	50	58	60	64	70	77	80	85	2	15
" 31	48	52	60	63	68	76	79	82	88	3	17
" 32	50	54	62	66	74	82	89	95	100	3	19
" 33	52	56	65	70	78	89	96	05	115	3	21
" 34	55	60	67	75	83	96	108	115	125	3	25
" 35	.....	70	75	85	95	105	120	130	.....	.....	Polished or Scratch
" 36	.....	85	95	105	120	125	140	.....	.....	.....	Brushed 2 sides double above prices.
" 37	.....	100	110	125	140	155	170	.....	.....	.....	
" 38	.....	120	135	150	165	180	200	.....	.....	.....	
" 39	.....	140	160	180	200	220	.....	.....	.....	.....	
" 40	.....	170	200	220	240	.....	.....	.....	.....	.....	

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheeet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

Discounts as Follows are Given for Sheet Orders Over 200 Pounds.

200 to 1,000 pounds..... 10 per cent. off list.
1,000 to 2,000 " ..... 10 per cent. and 2 " "
2,000 to 4,000 " ..... 10 " " 3 " "
4,000 pounds and over ..... 10 " " 5 " "

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

STUBS' G.	1-4"	3-8"	1-2"	5-8"	3-4"	1"	1 1-2"	2"	2 1-2"	2 3-4"
4 to 11	.....	.....	96	86	83	77	67	61	61	61
12	.....	1 08	96	86	83	77	67	61	61	61
13	.....	1 08	96	86	83	77	67	64	64	64
14	.....	1 08	96	86	83	77	67	64	64	64
15	.....	1 12	96	89	86	80	70	67	67	67
16	.....	1 15	99	93	89	83	70	70	70	70
17	.....	1 18	1 02	96	93	86	73	73	73	73
18	1 85	1 24	1 05	99	93	86	77	77	77	80
19	1 88	1 28	1 08	1 02	99	93	83	86	80	83
20	1 95	1 31	1 15	1 08	1 05	99	89	86	86	89
21	2 01	1 37	1 21	1 15	1 12	1 05	99	93	93	96
22	2 17	1 44	1 24	1 18	1 15	1 08	1 05	99	1 05	1 05
23	2 33	1 50	1 31	1 24	1 21	1 15	1 15	1 08	1 15	1 15
24	2 48	1 60	1 37	1 31	1 28	1 18	1 21	1 21	1 24	.....
25	2 65	1 69	1 47	1 37	1 34	1 28	1 34	.....	.....	.....

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

Discounts as Follows are Given for Tube Orders Over 50 Pounds.

50 to 200 lbs..... 5 per cent. discount off list
200 to 2,000 lbs..... 10 " " " " "
2,000 to 4,000 lbs..... 10 and 3 " " " " "
4,000 lbs. and over..... 10 and 5 " " " " "

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B.& S.G'ge.	0000 to No. 10	No. 11	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Brape's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.

MASS. INST. TECHNOL.
MINING LABORATORY
18 DEC 1905

MASS. INSTITUTE OF TECHNOLOGY
15 DEC 1905
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THE METAL INDUSTRY

With which are Incorporated The Aluminum World.
The Brass Founder and Finisher and Electro Platers Review.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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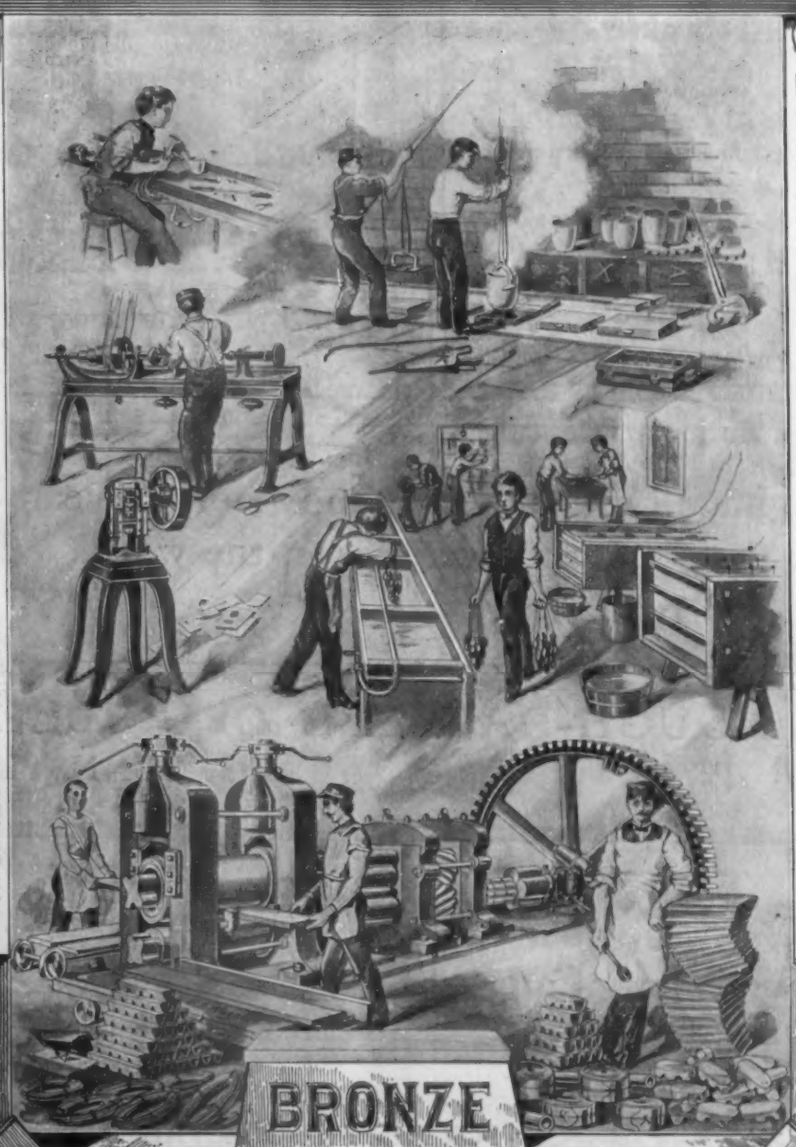

OLD SERIES Vol. XI, No. 12.
NEW SERIES Vol. III, No. 12.

LABOR OMNIA VINCIT

DECEMBER, 1905

NEW YORK.

61 BEEKMAN ST.

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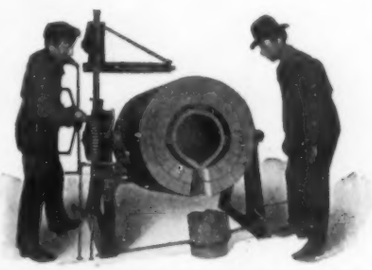

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The results have been much better than we anticipated when we placed our first ad. with you some four months ago. Our October advertisement has already brought us six inquiries for further information regarding our American Stoker Metal Melting Furnace. Very truly yours,

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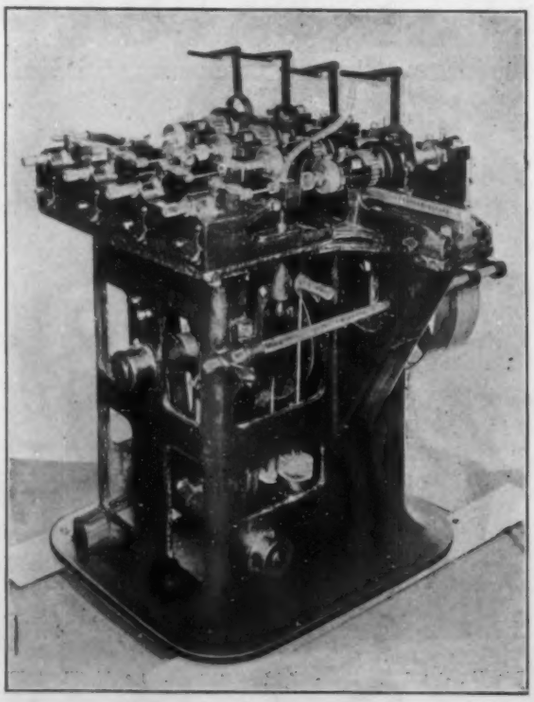
Four Spindle Automatic Cock Grinder. Send for further particulars.



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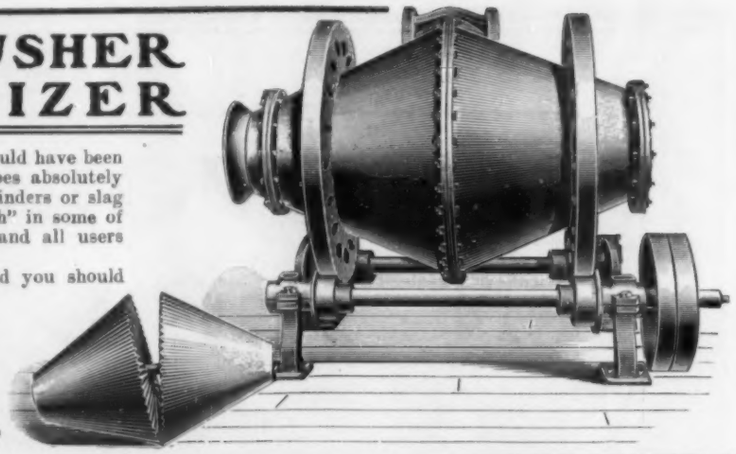
It is surely a great money and labor saver and you should know about it.



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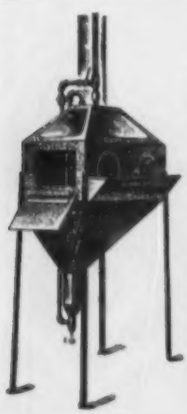

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Goods Shipped from Nearest Warehouse to Your Foundry

Prompt Shipments! Best Goods! Right Prices!

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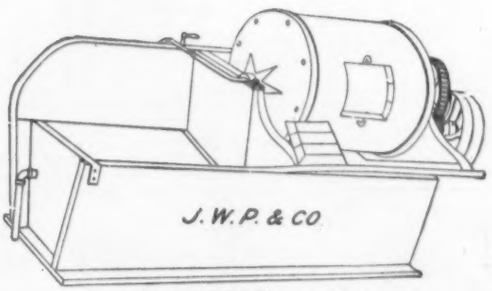

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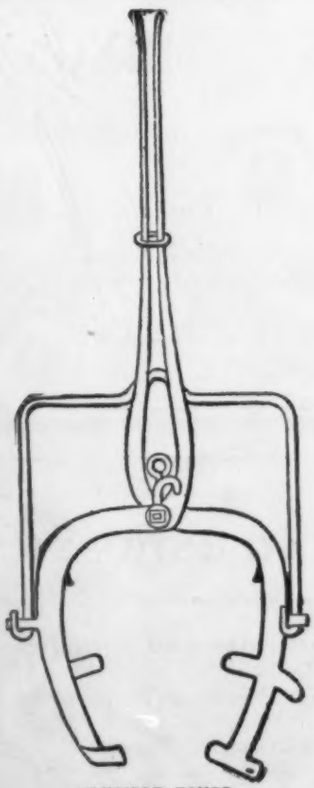

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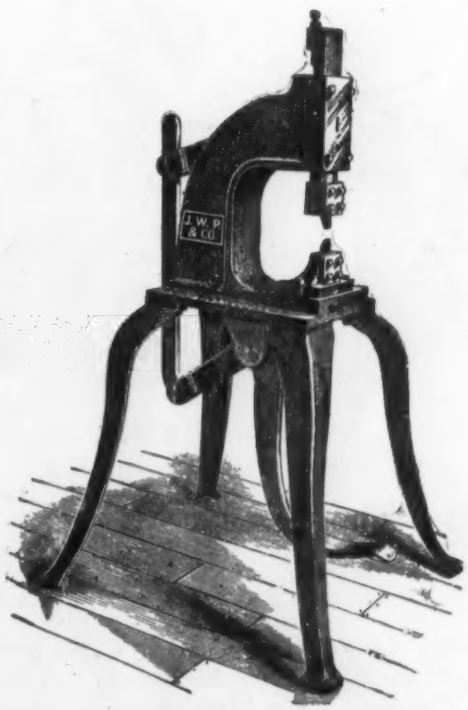

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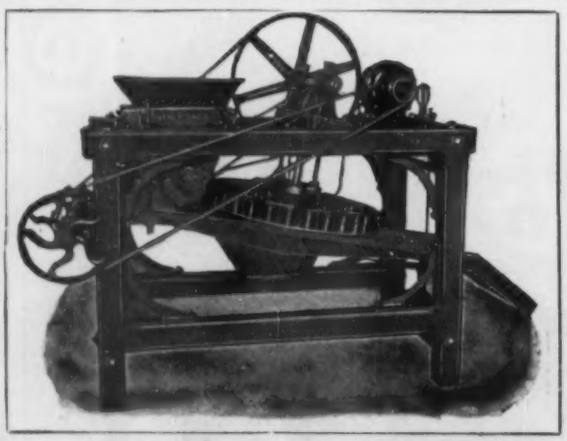

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that we make which is used on silver and gold finishes.

Somewhat higher in price than our regular silver lacquer, but of higher value.

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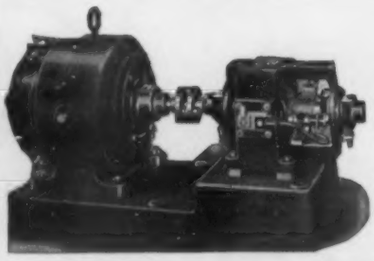
Our Aluminum Castings are especially adapted to Automobile, Auto Boat and Electrical Construction



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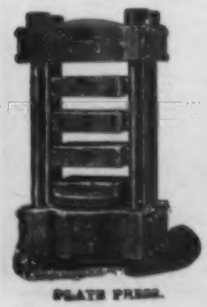
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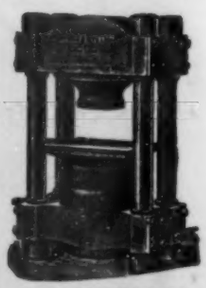
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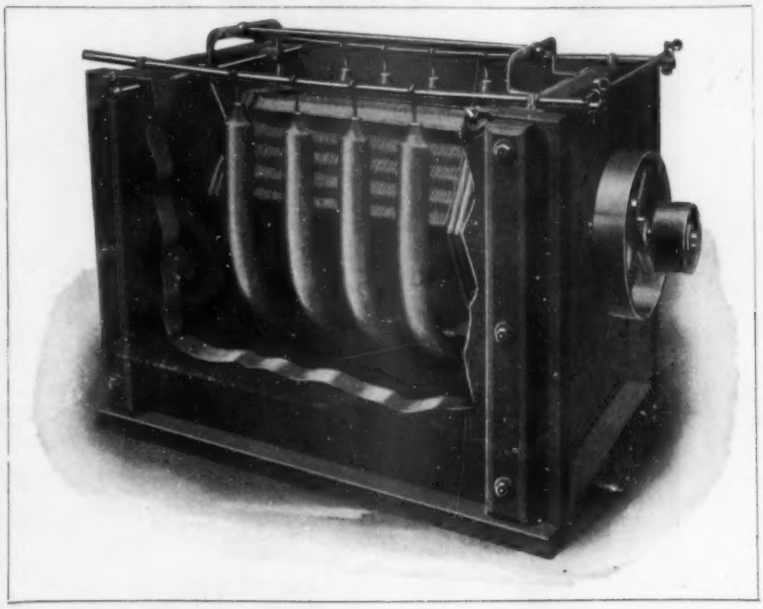
Other Patents Pending.



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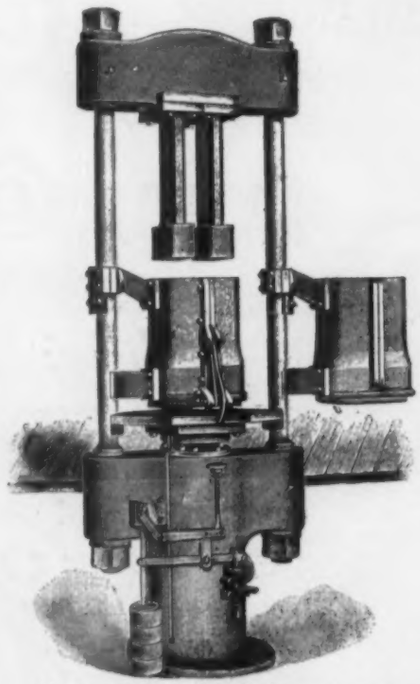

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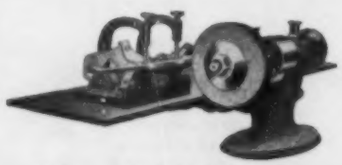

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This machine is the same as our No. 3 Grinder, but is supplied with a table in place of rests. A holder for clamping a skate blade securely is also furnished.

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JUST WHAT ITS NAME IMPLIES

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It is put up in sealed cartons and enclosed in a tin can, which keeps it intact and in original condition until used—no waste.

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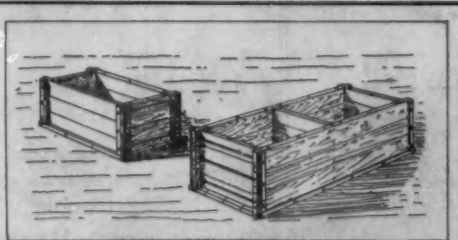

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